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■

URBAN STUDIES PROGRAM

Proposed Policies and Procedures

DEPARTMENT OF DEFENSE

Corps of Engineers, Department of the Army

[33 CFR Part 264]

URBAN STUDIES PROGRAM

Proposed Policies and Procedures

Notice is hereby given that the Secretary of the Army (acting through the Chief of Engineers), is proposing a regulation prescribing the policies and procedures to govern the conduct of urban studies by the Corps of Engineers. Through the Urban Studies Program, the Corps of Engineers seeks to provide a range of urban water resource plans that are compatible with comprehensive urban development goals of the region under study. These plans will provide an integrated approach to water resources management and will be designed to meet applicable State and Federal requirements for implementation.

Prior to adoption of the proposed regulation, consideration will be given to any comments submitted to the Chief of Engineers. Such comments should be sent to the Office of the Chief of Engineers, ATTN: DAEN–CWP–U, Washington, D.C. 20314, on or before August 5, 1974.

Until the final regulation is published in the FEDERAL REGISTER, this proposed regulation will provide interim guidance for the Corps of Engineers in conducting urban studies. The final regulation will be so codified so as to include the Urban Studies Program Study Procedure, currently issued as Appendix A, in the body of the regulation.

Dated: June 28, 1974.

J. W. MORRIS,
Major General, USA,
Director of Civil Works.

PART 264—URBAN STUDIES PROGRAM

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AUTHORITY: Sec. 1, Pub. L. 685, June 20, 1938, 52 Stat. 802 (33 U.S.C. 540); sec. 4, Pub. L. 429, as amended, Mar. 4, 1913, 37 Stat. 826 (33 U.S.C. 542).

§ 264.1 Purpose.

This regulation establishes the policy for and provides procedures to be followed in the conduct of an urban study.

§ 264.2 Applicability.

This regulation is applicable to all Office of the Chief of Engineers (OCE) elements and all field operating agencies having civil works planning responsibilities.

§ 264.3 References.

(a) Act of 18 October 1972, Pub. L. 92–500 (70 Stat. 498, 84 Stat. 91), Federal Water Pollution Control Act Amendments of 1972.

(b) Act of 1 January 1970, Pub. L. 91–190 (83 Stat. 852), National Environmental Policy Act.

(c) Act of 31 December 1970, Pub. L. 91–611 (84 Stat. 1818), Rivers and Harbors and Flood Control Act of 1970.

(d) Act of 7 March 1974, Pub. L. 93–251 (88 Stat. 12), Water Resources Development Act of 1974, Section 80 (88 Stat. 34).

(e) Water Resources Council (WRC) Principles and Standards for Planning Water and Related Land Resources, 38 FR 24778–24869, 10 September 1973.

(f) Engineer Regulation (ER) 18–2–2.

(g) Engineer Regulation (ER) 1105–2–10.

(h) Engineer Regulation (ER) 1105–2–403.

(i) Engineer Regulation (ER) 1105–2–507.

(j) Engineer Regulation (ER) 1120–2–112.

(k) Engineer Pamphlet (EP) 1165–2–1.

§ 264.4 Definitions.

As used in this regulation, the following definitions apply.

"Public"—Any non-Corps of Engineers entity. This includes other Federal agencies, State and local governments, public and private interest groups, and concerned individuals.

"Institution"—Any process or organization that is highly structured, systematized, and stable. It may be a type of group, e.g., a metropolitan sanitary distract or a council of governments, or it may be a formalized practice, e.g., a water rights law or a water usage ordinance.

"Procedure"—A required course of action to be followed in the development of plans.

"Guidance"—Information distributed by HQDA (DAEN–CWP) WASH DC 20314 to assist field offices in carrying out the procedures specified in Appendix A below. Generally, this may involve updating information on technologies, processes, or similar items.

§ 264.5 Policy.

Basic policies of the Office of the Chief of Engineers pertaining to the Urban Students Program are set forth below.

(a) Comprehensive urban area planning is to remain a local responsibiilty. The Corps of Engineers may augment local planning efforts by developing alternative urban water resource plans. One of these alternative plans may be selected by responsible officials as a component of a comprehensive urban area plan.

(b) Urban water resource planning conducted by the Corps of Engineers must not duplicate other Federal programs.

(c) Wastewater management components of alternative urban water resource plans must fulfill the intent of Pub. L. 92–500, § 264.3(a).

(d) Throughout the conduct of an urban study, there must be full and continuous coordination with the public. The public must not only be educated and informed about what is occurring but must also be included and actively involved in the planning process.

(e) Where specific water resource elements, such as commercial navigation, are included in an urban water resource plan, the plan development of that specific element should be in accordance with the established Corps policy for the element. Where wastewater management is the element, the plan development of that element will be in accordance with Environmental Protection Agency regulations and Part Three of Appendix A to this part.

§ 264.6 The importance and priority of the Urban Studies Program.

The Corps of Engineers is involved in the Urban Studies Program in response to the critical need for Federal assistance to solve regional urban water resources problems. Urban problems share, along with energy problems, the top priority of all Civil Works planning missions. Accordingly, offices responsible for the conduct of urban studies should give this program the requisite direction and attention.

§ 264.7 Procedures.

District and Division offices conducting urban studies will follow the procedures contained in Appendix A below. Where the local situation dictates that a deviation from these procedures may be appropriate, written permission should be requested from HQDA (DAEN–CWP) WASH DC 20314.

§ 264.8 Recommendations for improvement.

Comments or recommendations for improvement to Appendix A below will be welcomed if submitted to HQDA (DAEN–CWP–U) WASH DC 20314. Comments or recommendations should suggest improved or substitute text for the passages cited.

For the Chief of Engineers.

RUSSELL J. LAMP,
Colonel, Corps of Engineers,
Executive.

APPENDIX A—URBAN STUDIES PROGRAM STUDY PROCEDURE

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PART ONE

CHAPTER 1

Introduction

1–1. *Purpose.* a. The purpose of this chapter is to introduce key concepts which are discussed in further detail in succeeding chapters.

b. The Corps of Engineers through its Urban Studies Program seeks to provide a range of urban water resource plans that are compatible with comprehensive urban development goals of the region under study. These plans will provide an integrated approach to water resources management. This procedure is designed to assure that the residents of the study area will guide the development of these plans. The planning process is structured to assure that the evaluations of the plans developed highlight the advantages and disadvantages of each plan. In order for these urban water resource plans to be compatible with the regional interests, planners and engineers must keep the broad problems and issues of the region in mind while developing solutions on specified water resource problems. Urban water resource plans have some impact upon almost all activities of the public. By discussing potential solutions and their related impacts with the public, the development of plans whose impacts are contrary to public preferences can be avoided.

1–2. *State and Federal Requirements.* a. The plans that are developed must meet applicable State and Federal requirements. A range of plans will be developed to address the urban water resource problems, needs, issues, and concerns of the region. The range of plans will include one plan which optimizes national economic development (NED) and one plan which emphasizes environmental quality (EQ). The Federal interest used as a basis for funding certain components of any plan ultimately selected is specified in § 264.3(e). Plans directed toward attaining the national objectives of NED and EQ would provide the basis for assessing the extent of Federal funding for the plan(s) which the people of the region desire. The applicable interest rates used in economic analyses will reflect § 264.3(d).

b. Because of the legislative requirements established by Pub. L. 92–500, § 264.3(a), waste-water management elements are subject to a number of planning constraints which must be considered. The remainder of this subparagraph describes the relationship of the Urban Studies Program to various segments of Pub. L. 92–500.

(1) Section 101 establishes a set of national water quality goals which are further enunciated in section 301. These sections establish dates by which wastewater treatment facilities must achieve certain treatment levels. These dates—1983 and 1985—and their respective treatment levels are more fully discussed in para 3–1 through 3–5. Implementation of the wastewater elements will be phased over the study period to assure that plans achieve the water quality goals and standards specified in para 3–1 through 3–5. It is particularly important that a clear, concise display of the costs and impacts associated with the phased achievement of each goal over time be presented.

(2) The plans prepared in the course of an urban study should assist local governments in fulfilling certain of the requirements of a Step 2 (Preparation of Construction Plans and Specifications) construction grant application for section 201, "Facilities Planning." 40 CFR 35.920–3(b) sets forth the 14 items to be covered in a Step 2 construction grant application. The Plan of Study must clearly set forth which participating agency is to provide each element of the Step 2 grant application. Conceivably, some of the elements may be developed after the Corps of Engineers completes its portion of the study effort. Specific interpretations of the level of detail associated with each element in the above referenced CFR should be obtained from the EPA Regional Office in whose jurisdiction the study area is located.

(3) As a portion of the engineering report required for a Step 2 grant application, a sewer system evaluation is required. This consists of two parts, an infiltration/inflow analysis and a sewer system evaluation survey.

(a). The infiltration/inflow analysis is a cost effectiveness analysis based upon existing data. The analysis is designed to show whether the costs to rehabilitate sewers to reduce infiltration and inflow is greater than the costs to treat this added flow. If the cost to treat is less than the cost to rehabilitate, infiltration/inflow is not excessive.

(b). If the analysis indicates that infiltration/inflow is not excessive, and EPA agrees with this finding, no further efforts need be expended on this task. However, if infiltration/inflow is determined to be excessive and EPA concurs, then a sewer system evaluation survey is required. Part Three, Chapter Two discusses the Corps' position regarding these two phases of a sewer system evaluation in further detail.

(4) When assisting local interests in the development of elements for a Step 2 grant application the function of certifying a plan is vested in the State. The State agency must forward, with each construction grant application submitted to the Regional Administrator, a certification that the proposed project is entitled to priority in accordance with the State priority system, and requires the specified funding requested from allotments currently available. Also included in priority certification is a statement that the award of a grant for the proposed project will not jeopardize the funding of any treatment works of higher priority. The State agency is responsible for defining the scope of treatment works projects and determining the time when such projects are to receive Federal financial assistance.

(5) Section 303, "Water Quality Standards and Implementation Plans," 40 CFR 130, "State Continuing Planning Process," and 40 CFR 131, "Water Quality Management Plans" describe State requirements in three areas. These requirements concern what the state has to do to establish a series of stream water quality standards, develop a priority listing of municipalities not achieving the stream standards, and develop information to implement a waste discharge permit program. Urban water resources planning is not normally concerned with the type of planning required by section 303. However, information developed in the course of an urban study may be modified and augmented, as necessary, by the State to satisfy requirements imposed by section 303.

(6) The planning process in this appendix was developed to reflect the intent of section 208, "Areawide Waste Treatment Management." Particular attention has been devoted to formulating a planning process which incorporates the planning requirements contained in section 208(b).

(7) This procedure does not apply to studies conducted specifically to satisfy section 209, "Basin Planning". Those plans generally conform to Water Resource Council Level B criteria, § 264.3(k).

1–3. *New Concepts.* The WRC Principles and Standards and this regulation introduce many new planning principles and codifies many techniques for following these principles. The most important of these are discussed below.

a. *Problems, Issues and Concerns of the Region.* The problems, issues, and concerns addressed in the study will not be limited to water resource problems but will include related matters such as growth policies. A full understanding of both water resource and related impacts is important to decisionmakers. Problem identification is described in greater detail in para 1–17.

b. *Planning Objectives.* National objectives are drawn from § 264.3(e). Study area planning objectives are developed based upon the problems, issues, and concerns identified.

The planning objectives which are based upon water and related land resource problems direct the planning effort and serve as a portion of the criteria for impact assessment and decision-making. This is further explained in para 1-17. In terms of this document, "impact assessment" is synonymous with "effect assessment."

c. *Public Involvement.* Defining the public as any non-Corps of Engineers entity enlarges substantially the traditional, more narrow view of public. Public involvement throughout the entire planning process is necessary to assure that the various segments of the public have a role in decisions that affect their future. Public involvement is further discussed in Part Two, Chapter Two.

d. *Display of Impacts.* The words impact and effect are used synonymously in this appendix. The evaluation and display of impacts will provide the public and their selected and appointed representatives with the information necessary for responsible decision-making. A system of accounts as specified in § 264.3(e) will be used. The evaluation display should contain information presented in such a way that an individual can readily distinguish separate sections that meet legislative requirements, and reflect local, state, and Federal interests.

1-4. *Water Resource Plan Product.* a. The product of this planning process will consist of the following:

(1) A series of three to seven alternative urban water resources plans to meet long range (approximately 50 years) needs, from which a choice may be made by the public prior to completion of the study.

(2) A priced and evaluated portion of each of the alternative urban water resource plans to meet short range (approximately 20 years) needs.

(3) A phased early action program for the study region for each alternative urban water resource plan to meet short range (approximately 20 years) needs.

(4) If appropriate, a proposal for Congressional authorization of selected projects of the early action program of the publicly selected "best" plan where these selected projects are traditional Corps of Engineers functions.

b. The alternative urban water resource plans will be composed of three elements, described in para 1-9 through 1-12. Included in the three elements are implementation arrangements required for the efficient creation of each element. The three elements are:

(1) Capital Improvements.

(2) Management Programs.

(3) A Revision Program.

CHAPTER 2

Urban Water Resources Planning

1-5. *Purpose.* This chapter describes the concepts governing the development of an urban water resources plan and differentiates between urban water resources planning and comprehensive urban area planning.

1-6. *Objective of Urban Water Resource Planning.* a. The objective of Corps of Engineers urban water resource planning is to develop, in conjunction with the public, plans which not only offer realistic prospect for solving specific urban water resource problems but, equally important, also have the potential to serve as a catalyst for solving other related urban problems. In satisfying this objective, urban water resources planning must be consistent with the national objectives established by § 264.3(e). The national objectives are—

(1) To enhance national economic development (NED).

(2) To enhance the quality of the environment (EQ).

b. In order to achieve the above objectives, urban water resource plans should exhibit the following characteristics.

(1) Address the specified water resource problems, issues, and concerns of the regional publics by responding to expressed desires and preferences.

(2) Be flexible to accommodate changing economic, social, and environmental patterns and new technologies.

(3) Intergrate with and be complementary to other urban development and management programs.

(4) Be fully coordinated with affected agencies at all levels.

(5) Be developed through an orderly, structured, and open planning process.

(6) Be implementable with respect to financial and institutional capabilities and public consensus.

(7) Be acceptable to appropriate state and Federal agencies.

c. The guidelines and regulations to be followed for areawide waste treatment management and facilities planning are the responsibility of the Environmental Protection Agency (EPA). Therefore, close cooperation with EPA field personnel is necessary for proper interpretation of EPA regulations and guidelines in order to produce information which state governments can use in construction grant applications.

1-7. *Relationship of Urban Area Comprehensive Planning to Urban Water Resource Planning.* a. Comprehensive urban area planning generally is carried out by local or regional planning commissions. Urban area comprehensive planning focuses on a number of issues such as housing, transportation, health and social services, land use planning, solid waste management, and water resources management.

b. The Urban Studies Program will primarily address one of the issues in paragraph a, above—water resources management. In specifically addressing the urban water resources problems, the plans developed may affect other urban problems. For example, a plan restricting construction in a flood plain to reduce urban flood damages, may make land available for additional recreation areas, as well as control urban sprawl. Controlling urban sprawl could then affect urban area housing development.

c. Within the scope of water resources management, the Urban Studies Program addresses the following functional water resource components.

(1) Urban Flood Control.

(2) Flood Plain Management.

(3) Municipal and Industrial Water Supply.

(4) Wastewater Management.

(5) Bank and Channel Stabilization.

(6) Lake, Estuarine, and Ocean Restoration and Protection.

(7) Recreation Management at Corps' Civil Works Projects.

(8) Regional Harbors and Waterways.

d. Within any specific urban area, all, or only some, of these functional components may be applicable. Existing local plans for a functional component may be adequate for the planning time frame considered in a study. Where this occurs, these local plans will be incorporated into the urban water resource planning process.

1-8. *Composition of an Urban Water Resource Plan.* Each study will develop alternative urban water resource plans from which one may be selected for implementation. Every plan will provide solutions to the water resource problems addressed in a study. Each alternative plan will be composed of three elements. This approach should assist the local people in selecting a plan which not only solves the water resource problems but is compatible with local preferences. The three elements are—

a. Capital Improvements

b. Management Programs

c. A Revision Program

1-9. *Capital Improvements.* a. In developing capital improvements, or structures, both new construction and improvements to existing facilities should be considered. Capital improvements will include those structures which directly address the water resource problems as well as those facilities which may be a necessary by-product of the initial facility. For example, if a new harbor channel is dredged (capital improvement), a diked disposal area (capital improvement) may have to be constructed to contain the dredged material.

b. Alternatives for solving water resource problems may provide an opportunity for additional capital improvements by the private sector. This potential should be identified in the discussion of public capital improvement. The private sector may be required, under a specific alternative, to provide facilities which satisfy a specific need. For instance, a pretreatment facility to remove heavy metals from industrial waste prior to discharge to a municipal sewer is a private sector facility.

c. Study alternatives may suggest attractive opportunities for enhancing the nonwater resource needs of the region. For example, if a local issue is the siting of a new power generation facility, a land treatment system may provide the necessary cooling water while isolating the facility. While the study should not plan for a power generaton facility per se, the availability of land and water should be brought to the attention of the public utility.

d. Where existing facilities are incorporated in specific alternative, operation, maintenance, and replacement costs relating to those facilities should be included in any cost-effectiveness analysis.

1-10. *Management Programs.* Management programs are the measures necessary to make an alternative operate efficiently. They are distinguished from capital improvements because they do not necessarily involve major construction or engineering activities. Sometimes characterized as nonstructural approaches, management programs may still require investment. Management programs associated with resource utilization may include the following—

a. Regulatory activities, such as permits, building codes, ordinances, land use zoning, and control techniques.

b. Operation and maintenance procedures, such as guides for the use of physical components of water resource systems, training of personnel, and public education in resource use.

c. Fiscal controls, such as revenue production, cost-sharing, user fees, and development financing.

1-11. *A Revision Program.* a. Alternatives should contain a revision program to provide decision makers flexible plans that will be responsive to possible changes in needs and future base conditions. Periodic revisions are essential if the urban water resources plan selected is to be an instrument of continuous, dynamic planning and not merely a static end product.

b. In developing a revision program, potential changes or planning activities should be categorized as substantive or procedural.

(1) Substantive changes causing plans to be revised may include changes such as a council of governments modifying its land use protections, a radical change in energy availability, a new innovation in waste treatment technology, a change in the regulations implementing § 264.3 (a) or (e), or new water resource legislation.

(2) Procedural matters describing how to make revisions may include designating the agency responsible for future planning, the method or time period for review, and the method for modifying the plan.

1–12. *Implementation Arrangements.* a. Each plan element should contain implementation arrangements which describe the action necessary to take the plan from the conceptual state and place it in operation. Implementation arrangements are developed to provide for the most orderly and efficient creation of capital improvements, management programs and a revision program. Implementation arrangements may include changes in agency responsibility, methods of funding, and the fulfillment or modification of legislative requirements and constraints. Implementation arrangements should also include alternative arrangements which show how existing institutions might be incorporated, modified if necessary, new institutions created, or existing institutions abandoned in order to efficiently implement the plan.

b. To provide the public with a choice, each final alternative urban water resource plan should contain at least two different sets of implementation arrangements. Each set of arrangements must take a distinctly different approach to implement the plan. For instance, a single multifunction regional agency, a series of small, geographically defined agencies, or a series of smaller functionally defined agencies illustrates three different approaches. One set of implementation arrangements may be suitable for more than one plan. Each of the implementation arrangements will address—

(1) Time phasing.

(a) Of construction and associated design activities.

(b) For initiation of management programs.

(c) For the revision program.

(2) Total costs and cost-sharing arrangements. Special care must be taken to make sure that facilities for collection of run-off are identified properly and that construction costs are appropriately allocated to wastewater management and to flood control and, further, that flood control and wastewater management costs are apportioned between Federal and non-Federal interests. Close cooperation with EPA is necessary to assure that the appropriate distinctions will be reflected in the report.

(3) Agency responsibilities for implementation.

1–13. *Recommendations.* Two alternative courses of action exist regarding recommendations. They differ based upon whether or not a capital improvement is identical in all final alternative urban water resource plans presented to the public, and whether or not the public has selected a "best" plan. Irrespective of when a capital improvement is recommended for authorization, established Corps of Engineer's procedures regarding level of detail for authorization and other requirements will be followed.

a. If there is an identical capital improvement common to all final alternatives, the District Engineer may recommend that capital improvement for authorization when he presents the final alternatives to the public for choice, assuming that the capital improve is an element of the Corps' traditional role. The public's choice of alternatives is not contrained by the District Engineer's action.

b. If the capital improvements differ in either content or scope among final alternative urban water resource plans, or where an identical capital improvement does not exist in all final alternatives, or further, where no public consensus exists on a single "best" plan for implementation, the District Engineer may not recommend a capital improvement for authorization until a plan has been selected by the public for implementation. In this instance, recommending prior to public choice of a plan would effectively constrain the public choice to accepting the plan which contains the recommended improvement. The Corps' Report presenting the final alternatives will only be in partial fulfillment of the study resolution until such time as the public selects a plan for implementation; consequently, the District Engineer's Report is an "interim" report. After selection and approval of a plan by the appropriate publics the District Engineer may review the selected plan, and recommend for authorization those capital improvements within the Corps' traditional role. This recommendation will complete the District Engineer's response to the study resolution.

CHAPTER 3

The Planning Process

1–14. *Purpose.* The *Principles and Standards for Planning Water and Related Land Resources* establish basic Federal policy applicable to water resources planning. This chapter presents a general description of the planning process that is required in all urban studies to reflect § 264.3(e).

1–15. *General Planning Principles.* Plan formulation and evaluation is predicated on four planning principles which must be integrated into the conduct of an urban study.

a. Public involvement and agency coordination must be carried out throughout the study. Continuous interaction is paramount to the urban study effort in order to inform the public as to the nature and scope of the study and to elicit their input and feedback.

b. A sustained program of institutional analysis is essential. This will be undertaken to set forth the ways and means for implementing any plan which is selected.

c. The overall urban study planning process must be flexible and sensitive to accommodate changing conditions, information, and policies. Plan formulation and evaluation will be conducted in an iterative manner in which the planning tasks are repeated, or iterated, a number of times.

d. Because of the complex issues involved, the urban studies must be conducted by an interdisciplinary planning team. A wide variety of professional skills and view points should be involved in a complementary manner throughout the study.

1–16. *Stages of Plan Development.* Urban studies will be undertaken in three time-phased stages covering 36 months. This short time period is necessary to meet the deadlines of § 264.3(e) as well as to keep the plans relevant in light of rapidly changing urban problems. The planning process is divided into three stages to facilitate management by specifying at least three points for monitoring study progress and scope while providing for the orderly development of plans. Each stage has specific study outputs. These are intended to provide for the sequential review of study progress and to serve as a basis for making decisions about the nature, scope, and direction of the study effort.

a. Stage 1—The Plan of Study. This stage should be accomplished in 6–8 months. This stage should result in a clear indication of the scope of the urban study, the precise study area planning objectives it will pursue, specific constraints that have been identified, and how subsequent planning activities will be handled. The product of this stage will be the sections entitled, "Stage 1 Study Results" and "Plan of Study Coordination" of the Plan of Study document. Additional information on these and other sections of the Plan of Study is contained in Part Two, Chapter 1.

b. Stage 2—Development of Intermediate Plans. This stage should be accomplished in 10–12 months. This stage concentrates on a more thorough analysis of the problems, as well as the development of a preliminary range of solutions to the problems. It is not inconceivable that more than 50 alternatives will be developed in this stage at a very gross level of detail. Those showing promise may be carried forward, while others may be discarded due to adverse public reaction, or engineering or other reasons. The initial development of alternatives should not be unduly constrained. Plans developed which are contrary to existing public preferences permit a comparison showing the social, environmental, and financial cost of the preferences. A public reassessment of their preferences may result in a changing of those preferences to accommodate new or innovative concepts. The product of this stage should be the preparation of the draft Background Information Appendix, and a chronological draft of the Plan Formulation Appendix covering the first 16 to 20 months of the study. Analysis of these documents by all study participants, Division, and HQDA (DAEN–CWP) WASH DC 20314 should form the basis for decisions regarding how planning should be accomplished in Stage 3. A detailed description of the contents of these appendices is contained in Part One, Chapter 5.

c. Stage 3—Development of Final Plans. This stage should be accomplished in 16–20 months. This stage concentrates on developing an increasing level of detail on a decreasing number of alternative urban water resource plans. The reduction in the number of plans under consideration is accomplished through public involvement. The level of detail associated with the final plans should be comparable between capital improvements associated with the same water resource function, such as navigation, however, the level of detail associated with wastewater management may be different than the level of detail associated with navigation whereas all navigation improvements have the same level of detail. The level of detail for water resource functions that are part of the Corps' traditional role is determined by the Engineer Regulations concerning project authorization.The level of detail for wastewater management is determined by EPA regulations and guidance. The product of Stage 3 is the final study report. A detailed description of this document is contained in Part One, Chapter 5.

1–17. *Planning Tasks.* Planning will be conducted by carrying out four functional planning tasks during each of the three stages of plan development. These tasks are problem identification, formulation of alternatives, impact assessment, and evaluation. It may be necessary and even desirable to repeat or iterate these tasks a number of times during any one stage. Succeeding iterations should reflect an increasing level of effort, detail, and refinement. In addition, iterations also provide for incorporating additional information and for broadening the scope of the urban study as it progresses. Table 1–1 sets forth the relationship between the tasks and the three plan development stages.

a. *Problem Identification.* The purpose of problem identification is to identify the range of problems the study effort will address and to establish the study area planning objectives for the urban study. The planning objectives provide the direction for formulation of alternative plans and form the basis for assessing and evaluating alternatives. Prob-

lem identification involves the following activities:

(1) Identify public concerns.

(2) Analyze resource management problems.

(3) Define the study area.

(4) Describe the base condition.

(5) Project future conditions.

(6) Establish study area planning objectives.

b. *Formulation of Alternatives.* The purpose of formulating alternative plans is to develop and design complete urban water resource management systems which satisfy the planning objectives. Where urban studies include wastewater management as a component, it is likely that wastewater management measures would be the keystone of the formulation effort. Formulation involves the following activities:

(1) Identify the full range of resource management measures available for problem solution, including measures favored by representative segments of the public.

(2) Categorize applicable non-structural measures.

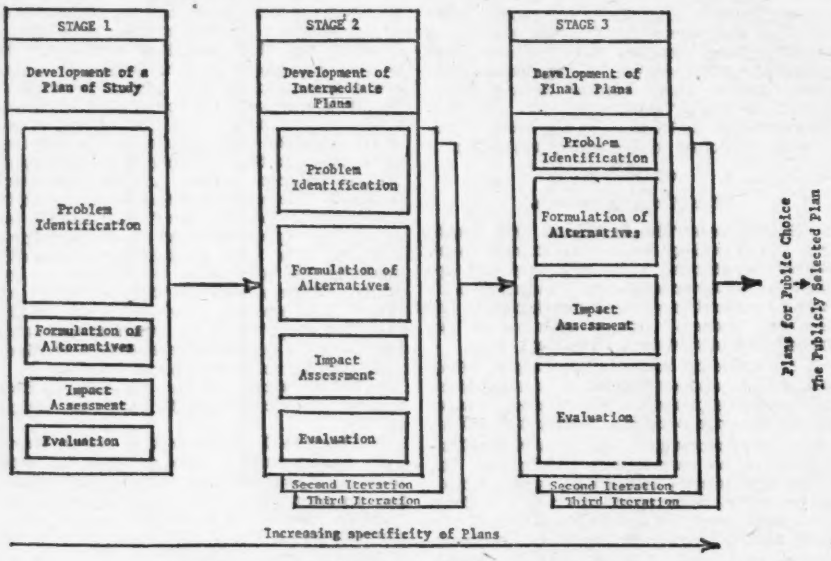


TABLE 1–1. Relationship of Planning Stages and Tasks

(3) Categorize applicable structural measures.

(4) Develop plans by combining measures.

(5) Consider plans of public.

c. *Impact Assessment.* The purpose of impact, or effect, assessment is to identify and measure the changes expected to result from different alternative plans. Impacts are identified by comparing all the components of an alternative plan to the base condition of the region to determine the economic, social, and environmental changes from the condition that are expected to occur with the plan. Impact assessment involves the following activities:

(1) Categorize the sources of impacts, such as inputs, outputs or facilities.

(2) Identify and trace impacts.

(3) Specify incidence of impacts, including spatial distribution, and when they will occur.

(4) Measure impacts.

d. *Evaluation.* The purpose of evaluation is to determine how well the alternative urban water resources plans achieve the planning objectives, and how the plans affect other related problems. Evaluation provides the basis for trading off among the alternatives so that recommended actions can be made. Evaluating alternative urban study plans is contingent upon reflecting publicly-held values to determine which are the beneficial and adverse aspects of each plan. Evaluation involves the following activities:

(1) Categorize impacts.

(2) Label NED and EQ plans.

(3) Determine the Federal interest.

(4) Apply other Federal evaluation criteria.

(5) Perform tradeoff analysis, in part through public involvement.

(6) Specify basis for next iteration.

CHAPTER 4

Organizing for an Urban Study

1–18. *Purpose.* The success of an urban study is largely affected by the organization of the study team, their consultants, and the Plan of Study (POS) that will direct their efforts. It is imperative that the study team consist of personnel capable of addressing the regional problems in an innovative, imaginative, and skillful, manner. Consultants must be selected on the basis of their ability to address the complex urban water problems with imaginative solutions. The Plan of Study should be sound enough to guide the entire study effort, and yet be as flexible as necessary to adapt to changes as they arise in the course of the study.

1–19. *The Study Team.* a. Field offices conducting urban studies should develop an organization which includes the following expertise:

(1) *Study Management.* Assigned personnel are concerned with the efficient conduct of the study including the allocation of funds and personnel (including consultants) to assure a balanced, acceptable study. They are also responsible for the monitoring of study progress to insure timely completion of tasks, adherence to established policy and guidance, and the execution of a quality public involvement program.

(2) *Plan Formulation.* Assigned personnel are responsible for formulating alternative urban water resource plans in accordance with procedures and philosophies contained in this regulation. Plan formulation includes interpreting the problems, issues, and concerns of the public, articulating water resource planning objectives and defining system outputs based upon the expressed problems, issues, and concerns. Plans are formulated from the range of resource management measures which include policies, programs, technologies, engineering inputs, institutional arrangements and implementation schemes. Assigned personnel must be capable of combining the partial inputs from the following three areas of expertise to produce balanced, publicly acceptable, plans.

(3) *Technical Systems Design.* Assigned personnel are responsible for the design of component technical portions (capital improvements) of the alternative plans formulated. These component technical portions must be properly designed and properly arranged in sequence to meet system outputs and planning constraints. Technical systems design will predominately respond to, and be guided by, material developed in the plan formulation area.

(4) *Impact Assessment and Evaluation.* Assigned personnel are responsible for identifying and measuring the impacts of each system on the existing and future regional profiles and the wide range of comprehensive urban planning objectives. Impact assessment also involves interpreting the expressed problems, issues, and concerns of the people and articulating water resource planning objectives. Evaluation includes summarizing the evaluative responses of the public and assisting the plan formulation and technical system design specialists in the modification and refinement of plans and plan components based on the responses.

(5) *Public Involvement and Institutional Analysis.* Assigned personnel are responsible for formulating and coordinating the execution of the public involvement program. Personnel are also responsible for identifying and analyzing the institutions affected by each plan, developing the necessary plan or institutional modifications, and assisting in the development of implementation strategies.

b. *The District Study Team.* Districts should organize an interdisciplinary team which has not other duties. Ideally, one specialist, or more as necessary, should be assigned to each area of expertise described in para *a*, above. The designated team leader should report directly to the Chief of Planning Branch or Planning Division, as appropriate. It is envisioned that a high level of involvement of the District Engineer or his deputy or designated assistant will be required on a day-to-day basis. Staff support for the interdisciplinary team will have to be provided promptly by other planning, engineering, and administrative elements when needed. Where a District has more than one urban study, certain specialists may work on more than one study. However, a separate Study Manager and Plan Formulation Specialist for each study is recommended.

c. *Division Offices.* Each Division with one or more urban studies will need an Urban Studies Program Coordinator and a small staff set out as an Urban Studies Branch. The Special Studies Branch can be designated if such a branch exists. This is seen to be a full-time effort in Divisions where Urban Studies are underway. While Divisions shall remain responsible for reporting study progress to OCE, more frequent communication between Division coordinators is essential to keep other Divisions apprised of study progress. Division Program Coordinators should perform the following tasks——

(1) Monitor study progress to achieve timely completion of studies within 36 months after funding;

(2) Disseminate pertinent information developed during the course of a study which may be of particular value to other Corps offices. The value may be in potential application of the data by another Corps office, or obtaining an expedited informal review. Information disseminated may include Plans

of Study, contractor scopes-of-work and reports, public involvement documents, and study reports. Information should be selectively furnished to—

(a) Other Districts in the Division.

(b) Other Division Program Coordinators.

(c) Respective OCE Reports Management Branches, who should receive a copy of everything sent to either (a) or (b) above.

(3) Developing requests for training and provide training or request HQDA (DAEN-CWP) WASH DC 20314 to provide training.

(4) Co-ordinating and conducting "on-board" reviews of urban studies.

(5) Monitoring funding obligations and expenditures.

1–20. *Consultants* a. Districts may elect to use consultants to augment in-house expertise, to provide expertise unavailable within the Corps, or to gain added familiarity with the study area. Included as potential consultants are—

(1) Separate Class II Activities of the Army such as the Cold Regions Research and Engineering Laboratory (CRREL), the Waterways Experiment Station (WES), the Hydrologic Engineering Center (HEC), and Institute for Water Resources (IWR).

(2) Other Federal and Regional Agencies.

(3) Private architectural-engineering firms.

(4) Citizens having requisite special skills.

b. The preparation of the Plan of Study is an orientation period for the study team. Because the POS provides guidance for the entire study and involves mandatory coordination, the study team will write the POS. However, this does not preclude the use of consultants to provide background data and information necessary for the Corps to write a POS.

c. Prior to contracting for the acquisition of a specific area of expertise, careful consideration should be given to the alternative of developing this expertise in-house. Where additional future urban studies or other preauthorization studies with similar procedural requirements are contemplated, additional training for Corps personnel may be not only cost-effective, but also advantageous to professional skill development.

d. During Stages 1 and 2 of the study, the main emphasis is on problem identification and public involvement. During these stages, contracts to supplement the in-house expertise in the above areas may be valuable. While most baseline data on water resource problems should be available, limited contracts to obtain baseline data for infiltration/inflow analyses may be executed at the beginning of Stage 2. Planning during the first two stages should incorporate in-house technical systems design expertise in the formulation of alternatives. It would be imprudent to contract for technical systems design (engineering) expertise until after Stage 2 is essentially complete. Contracting for this scale of expertise during the initial two stages is considered to be an inefficient expenditure of funds, and it could deprive District personnel of the opportunity for effective participation in the study.

e. A conscious effort should be made to limit the total amount of an urban study which is accomplished by contract. This is particularly important in the wastewater management portion of an urban study because this represents a new area in which the Corps should acquire in-house expertise. In contracting out portions of an urban study, particularly wastewater management, the following considerations should be observed—

(1) The Corps must reserve for itself the responsibility for comparing and evaluating alternative resource management elements to assure that wastewater management planning is integrated with planning for the Corps' traditional roles.

(2) Different contractors should be used to develop alternative measures for wastewater management utilizing land treatment and plant-type treatment. While consideration of the technical system outputs and resource requirements of these measures is inherent in the formulation of alternatives, ultimately, the Corps will have to verify the technical and engineering adequacy of each plan developed, as well as verify the full range of impacts caused by the system outputs and resource requirements. Utilizing more than one consultant will preclude any appearance of bias toward one measure at the expense of the others.

f. Prior to contracting for the development of methodologies such as a new method of impact assessment or a new method of analyzing institutions, Districts should ascertain whether other Corps elements have developed useful methodologies. OCE has developed methodologies for plan formulation, evaluation, and institutional analysis. These are available in all Corps offices with Civil Works planning responsibilities. Work completed a year or two earlier may be satisfactorily applied to a new study. In like manner, ongoing developments may be shared by more than one District if costs are appropriately shared. Where more than one District in a Division surfaces the same need, the respective Division should consider coordinating the effort. Where several Divisions surface the same need, HQDA (DAEN-CWP) WASH DC 20314 will consider coordinating the effort. In both cases, equitable sharing of costs may permit all partners, and the Corps in general, to realize far greater returns on their accumulated investment than a series of small, redundant efforts would permit.

1–21. *The Plan of Study.* a. Preparation of the Plan of Study (POS) is the first major substantive task to be undertaken in the conduct of an urban study. The POS is a multiple-party agreement that specifies the scope of the study, describes an initial set of problems, issues, and concerns to be addressed, and delineates the anticipated public involvement program strategy. As such, it serves as a planning and management tool. It should specify who will do each portion of the study, when each part will be done, and how the total effort will be managed. A detailed discussion of format and content is contained in Part Two, Chapter 1.

b. The Plan of Study, as the first major study output, should serve as a focal point for the initiation of the public involvement program. The POS will describe how the public will be involved in the study, and should provide the vehicle for initial contacts with the public. Part Two, Chapter 2 "A Public Involvement Program", contains information that is useful for planning and executing an effective public involvement program in the study region.

c. Table 1–2 contains a guide to allocating efforts in a Plan of Study for an urban study. These effort component breakdowns are based upon experience with the Pilot Wastewater Management Program. "Effort" as used in this appendix, refers to person-years of work multiplied by the annual cost of employing a person with that specific expertise for one year. "Total Combined Efforts" include all Corps efforts plus all other Federal efforts plus all non-Federal efforts plus all non-Corps of Engineer dollars disbursed in lieu of providing effort.

TABLE 1–2.—*Conceptual combined effort breakdown for a 3-year study period*

	Percent of total combined efforts		
Effort component	*Low*	*Average*	*High*
1. Preparation of a plan of study	5	6	7
2. Plan formulation and evaluation:			
a. Problem identification	7	9	11
b. Formulation of alternatives	20	25	30
c. Impact assessment and evaluation	20	25	30
d. Public involvement and institutional studies	19	21	23
3. Study documentation and report preparation	8	10	12
4. Study management	3	4	5
Total		100	

CHAPTER 5

d. The Plan of Study may require modification once the study is initiated for any number of reasons. Changes should be based upon mutual agreement by the parties allied in the Plan of Study, and documented in the Plan Formulation Appendix.

Study Reports and Documentation

1–22. *Purpose.* a. This chapter provides guidance for preparation and distribution of Urban Studies Program Study Reports. This chapter also briefly discusses the report review process. This chapter supersedes § 264.3(h) as it would apply to the Urban Studies Program.

b. The documents required under this chapter can be divided into the Summary Report with Appendices and Ancillary documents required to accompany the Study Report. Special reports prepared during the conduct of an urban study furnished to states or to other study participants for satisfying non-Corps of Engineers' requirements do not have to follow these guidelines. For example, a special report may be developed part way through the study to enable a state to satisfy a § 264.3(a) requirement. This report would have to satisfy an EPA format.

1–23. *Report Organization and Content.* The Study Report will consist of a separate summary document and supporting appendices as outlined in Table 1–3. Deviation from this format must be approved by HQDA (DAEN-CWP) WASH DC 20314 prior to writing the report.

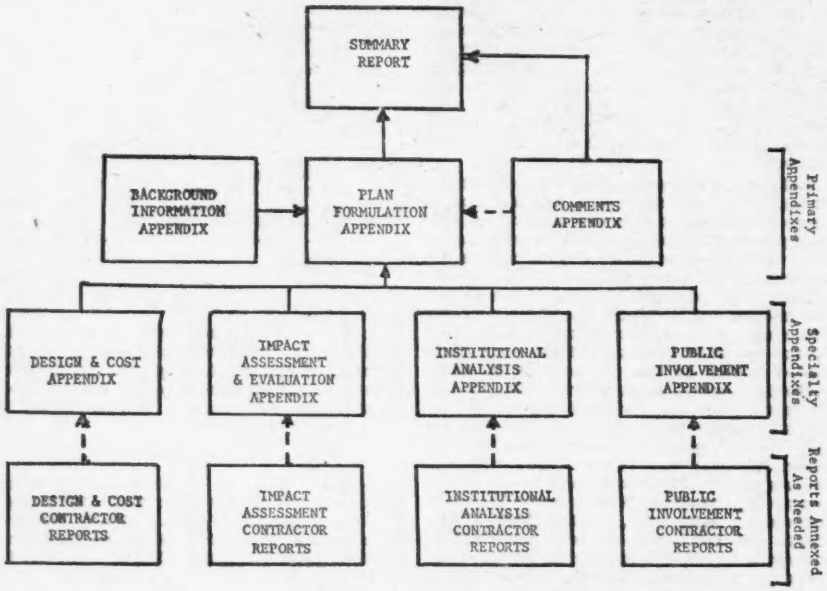
a. The Summary Report should be a well-illustrated document written by Corps personnel for the non-technical reader, and designed to be read in an hour or less. The document should essentially be a summary of the Plan Formulation Appendix. It should describe the study area highlighting problems, issues, and concerns, explain how the study was conducted, explain the final alternatives including a summary of impacts and present the final recommendations.

b. *Primary Appendixes.* (1) The Background Information Appendix provides a discussion of the existing regional profile and the desired future condition(s), and an identification of the specific problems, issues, needs and concerns to which solutions may be addressed.

(2) The Plan Formulation Appendix documents the articulation of significant regional problems, concerns, issues, and planning objectives, the formulation of alternative ur-

ban water resource plans, the design of component systems, impact assessment, evaluation, and iterative planning process. Also contained are implementation arrangements, a comparison of final alternative plans and their impacts. A summary of the public involvement program shall include a discussion of how it interacted with the planning process. This appendix, summarizing the specialty appendices is the key to the entire report. Throughout the text of the report, as decisions are described, the reasons for making each decision should be fully explained.

TABLE 1–3. Study Report Organization and Content



(3) The Comments Appendix documents the views of interested parties based on their review of the draft Study Report.

c. *Specialty Appendixes.* (1) The Design and Cost Appendix contains the technical detail supporting the engineering aspects of system components. As a minimum, the following items should be included for each system developed—

(a) All assumptions used.

(b) A description of all unit processes and components considered for inclusion and the reasons for acceptance or rejection.

(c) A range of the technical effectiveness and reliability for each engineered component.

(d) Schematics showing final configuration of engineered components, including projected performance of each component.

(e) All design parameters used.

(f) All cost curves or other estimating devices used, including how they were developed.

(g) An annotated bibliography.

(2) The Impact Assessment and Evaluation Appendix presents a rationale which illustrates how and why alternatives were accepted, reformulated, or rejected. The methodology used should be explained in sufficient detail to permit the readers to justify the impacts presented or form their own opinion as to what the impact should be. The use of a matrix in the final report in and of itself is acceptable only as a means of presenting verbal information in an organized manner. Mathematical matrices are inadequate as the only tool for measuring the impacts of alternative plans. In like manner, an arbitrary number range such as plus five to minus five, is inadequate for assessment or evaluation purposes and should not be used in any display. The use of such generalized values precludes meaningful comparison of the significance and specificity of impacts.

(3) The Institutional Analysis Appendix contains an analysis of the interaction of all the plans considered on existing or proposed institutions and organizations. It should include a delineation of proposed institutional and organizational modifications and/or conversely, how the plan was subsequently modified to accommodate the institution. Additionally, the rejection of plans based upon institutional or organizational problems should be discussed.

(4) The Public Involvement Appendix documents the chronological development and execution of the public involvement program. This program is assumed to begin prior to the development of the Plan of Study and to end with the final series of public meetings. This appendix should include an analysis of the public involvement program and the publics' response to it, modifications to the program based on public response and acceptance, and modification or rejection of plans based on public response.

d. The format and content described above enables all appendixes except the Comments Appendix to be written separately, providing for continuous drafting and review as the study progress. Though the appendixes are written concurrently, the overall relationship between them as outlined in Table 1–3, must be maintained. Continuous drafting assures that information is continuously available to all study participants for decision-making. Continuous drafting also precludes the necessity for a time-consuming writing effort at the conclusion of the study period. Documentation of many events that may have occurred up to 35 months earlier is very difficult. For example, the Background Information Appendix can be completed and available for informal review in Stage 2 because it provides the necessary definition of the existing regional profile from which all plan formulation proceeds. An exception is the Comments Appendix which is designed to contain information received after the draft Study Report is distributed.

e. Because the urban study is the ultimate responsibility of the Corps of Engineers, it is strongly recommended that the appendixes be written by Corps personnel with a single individual overseeing the preparation of the entire report to achieve uniformity in style and sensitivity to Corps policy. Any consultant's report should be attached as an annex to an appendix to reference technical information. A consultant's report should not comprise the appendix.

1–24. *Ancillary Documents.* These documents are not generally included in the Study Report, but accompany that report when formally transmitted to HQDA (DAEN–BR) Ft. Belvoir, VA 22060 by the District Engineer. These documents essentially fall into three categories, depending on their purpose and use. These categories are—

a. Documents prepared in the course of a study for public use at public meetings.

b. Documents for internal review by HQDA (DAEN–BR) Ft. Belvoir, VA 22060 that cannot be developed until the study is essential complete. Documents in this category include, but are not limited to, the District Engineer's letter of transmittal, notice and mailing list for each public meeting, public notice of report and its mailing list, and window shade display maps or slides.

c. Any document that requires coordination and review prior to study completion. At the present time, only the Environmental Statement is included in this category. A revised draft Environmental Statement for those aspects of the publicly selected plan which the District Engineer may recommend for authorization under existing study authorities of the Corps of Engineers will accompany the Study Report when it is submitted to HQDA (DAEN–BR) Ft. Belvoir, VA 22060, and other Federal and non-Federal agencies for review. Consult ER 1105–2–507, § 264.3(1), for additional detail on environmental statements.

1–25. *Draft Report Review Process.* a. ER 18–2–2, § 264.3(f), establishes a series of milestones for preauthorization studies to facilitate intensive management. ER 1105–2–10, § 264.3(g), establishes two on-board review conferences; Checkpoint I at Milestone 04 and Checkpoint II at Milestone 06. The Checkpoint I conferences will be held near the end of Stage 2. The Checkpoint II conference will be held near the end of Stage 3. ER 1105–2–10 specifies certain specific information which is to be furnished to all the participants in each of these two conferences prior to the conference.

b. Continuous drafting of the study report as described in para 1–23.d. will result in the completion of the Background Information Appendix part way through Stage 2. Similarly, continuous drafting will document the planning process and the results of the first two stages in the Plan Formulation Appendix. These two documents, if properly prepared, should satisfy the majority of the information required for the Checkpoint I, Milestone 04 conference. These documents, and other prepared for the Checkpoint I, Milestone 04 conference is necessary, should serve as the foundation for public involvement at this stage. However, a separate document may have to be prepared for public dissemination.

c. As noted in ER 1105–2–10, the draft Study Report may serve as the majority of the information to be furnished prior to the Checkpoint II, Milestone 06 conference. However, a separate summary of policy problems and issues, and controversy will have to be prepared especially for this conference.

d. The District Engineer's Report for an urban study will follow the same review process as a traditional survey scope study report.

1–26. *Draft Report Review Coordination.* ER 1120–2–112, § 264.3(j), will be followed to assure that the potential impacts of the alternatives are recognized by all Federal and non-Federal agencies. Field offices should use the latest version of OMB Circular A–95, published in 38 FR 32874. An earlier edition of this circular was attached as an appendix to ER 1120–2–112.

PART TWO

CHAPTER 1

The Plan of Study (POS)

2–1. *Purpose.* The purpose of this annex is to establish a general format and content for Plans of Study to be prepared under the Urban Studies Program. Included are examples of tables and schedules to be incorporated in the POS. Single purpose wastewater management planning studies conducted by the Corps of Engineers under either Congressional resolution or pursuant to section 208 of § 264.3a will also follow this format and content.

2–2. *Plan of Study Objectives.* Each POS should fulfill three objectives.

a. Document the planning efforts of Stage 1.

b. Provide a tool to facilitate study management and review of study progress.

c. Serve as an agreement of participation by all pertinent Federal and non-federal agencies and other publics concurring in its content.

2–3. *Elements of a Plan of Study.* Each POS should have the same format to facilitate review and comparability. Accordingly, each POS should contain the following four sections.

a. Justification for the Study.

b. Stage 1 Study Results.

c. Study Effort Allocation.

d. Plan of Study Coordination.

2–4. *Justification for the Study.* This section of the POS should contain the following three subsections.

a. *Introduction.* The introduction should briefly explain the purpose of the POS and the relationship of the POS to study participants.

b. *Authority.* The authority for making the study should be briefly stated. Copies of resolutions should be included as an appendix to the POS.

c. *Program Objectives.* This subsection should explain the objectives of the Corps of Engineers' Urban Studies Program or single purpose wastewater or section 208 study as they broadly relate to the study area.

2–5. *Stage 1 Study Results.* This section should report on the initial stage of the study. It should provide a dynamic framework of substantive information upon which to structure the study. The framework is based upon a broad survey of issues and concerns leading to preliminary definition and analysis of the problems. The public plays an essential role in providing this information. The following subsections should be included.

a. Identification of the Study Area. A brief overview of the existing regional profile of the study area is essential. Additionally, reasons for selecting the boundaries of the study area should be discussed along with the relationship of the study area to surrounding areas. For instance, the quality and quantity of drainage waters originating upstream may affect the study area as the drainage water flows through it. This cause-effect relationship should be discussed.

b. Description of Existing Problems. A discussion of the existing problems within the study area is necessary. Issues and concerns related both directly and indirectly to water resources must be included.

c. Statement of Study Planning Objectives. Based on the description of problems in the previous paragraph, preliminary water resources planning objectives should be identified. These should draw upon the Urban Studies Program objectives, national planning objectives from § 264.3(e) and the existing local and regional objectives. All the above objectives and problems should be combined into a set of unified and concise study planning objectives. The specificity of these study planning objectives is important. Phrases such as "wastewater management" or "navigation" are insufficient. Rather, statements such as "Upgrade the wastewater management systems in the study area to meet the 1977, 1983, and 1985 goals of Pub. L. 92–500" or "Reduce the incidence and amounts of damages resulting from flooding in the ____ Creek drainage area of *City, State*" are required.

d. Current Planning and Related Data. Included in this section should be a resume of planning activities currently under way or authorized within the study area by Federal, State and local agencies. Sources of available data and pertinent reports should be shown. It is probable that much of this information will be obtained as a result of contacts made during coordination of the POS.

e. Public Involvement Strategy. Because public involvement must begin as soon as the study is initiated, the public involvement strategy for the entire study should be outlined as soon as possible. Tentative dates for public meetings based on expected progress of the study should be developed. Preparation of brochures, development of workships, and other activities for involving the public in the planning process also should be discussed. All of this information should be included in this subsection.

f. Institutional Arrangements. Basic information on existing institutional arrangements should be included. Significant authorities, spatial and functional responsibilities and institutional relationships should be discussed to establish a basic framework and usable starting point for subsequent study and analysis.

g. Study Management. This subsection must set forth the following information.

(1) The POS must clearly specify who has the final authority for the administration and management of the study. Is it the District Engineer, Chairman of the local Council of Governments, or other Federal or non-Federal agency representative? Irrespective of who has the final study authority, the District Engineer will retain the responsibility for the Corps portion of the total effort.

(2) The POS must identify the day-to-day study manager. The members of the study team and their areas of expertise must also be identified. If members of other Federal or non-Federal agencies augment the study team, these persons should be identified.

(3) Direct liaison with other Federal and non-Federal agencies should be documented. The study team's points-of-contact at the working level in these other agencies should be identified.

(4) The POS should contain a brief description of coordinating committees, or similar groups, which will be formed for the study. The description should include a discussion of how the inputs of these groups are going to be used, and whether these groups are going to act in an advisory, a managerial, or an administrative capcaity.

(5) The POS should cleary identify who is responsible for monitoring the progress of the study and comparing progress to the time, cost, and work effort schedules set forth in the POS. The parties responsible for modifying, and the parties responsible for approving any modifications to, the POS should also be identified.

2–6. *Study Effort Allocation.* In order to serve as a tool to facilitate study management and review, a POS must contain tables which show the allocation of costs and efforts to specific work elements. To promote comparability, this paragraph specifies those tables.

a. *Major Work Items.* The total study effort should be broken down into major work items. Examples of major work items are flood control and flood plain management, regional harbors and waterways, wastewater management, water supply management, and conservation of fish and wildlife resources. These major work items will be categorized as—

(1) *Specific Work Tasks.* Work tasks specify discrete duties to which costs or efforts may be allocated by individual study participants. Specific work tasks are prescribed in Table 2–4 (located at the end of this chapter) for the Wastewater Management major work item. These work tasks have been agreed upon by the Corps, EPA, and the Office of Management and Budget (OMB). Consequently, deviation from these shall not occur without the written approval of HQDA (DAEN-CWP) WASH DC 20314. Specific work tasks for other major work items will vary from study to study.

(2) *Effort Components.* Work tasks are grouped into effort components which facilitate study management and comparability. The effort components are displayed in Table 2–1 (located at the end of this chapter). Table 1–2 shows the percentage of effort ranges considered acceptable for a balanced urban study.

b. *Scheduling of Work Tasks.* Scheduling for the study must be based on the assumption that funding will be available to meet the required time frame and the most efficient course of action spelled out. Selection of the specific method of scheduling work tasks will be left to the reporting officer; however, the method selected should establish priorities of activities and key check points in consonance with the precedures contained in Part One, Chapters 2 through 5. Where two or more study participants are responsible for a single work task, the completion date of each participant's share of the work task shall be entered in the tables.

c. *Study Costs.* The total cost of each work task must be estimated and assigned to the responsible Federal or non-Federeal study participant. Where two or more participants are responsible for a work task, the total cost for the task will be split to illustrate each participant's share. In the context of the tables, "Total costs" is equivalent to "total combined efforts," defined in para 1–21.c.

(1) *Table Format.* (a) Tables 2–1, 2–2, and 2–3 (located at the end of this chapter) will be developed for each study. These tables summarize study effort allocation for an urban study. Table 2–1 contains total study costs by major work items and effort component. Table 2–2 summarizes Federal and non-Federal efforts by major work item. Table 2–3 summarizes Federal and non-Federal efforts by effort component. The right hand column of Table 2–2 should be identical to the bottom row of Table 2–1. The right hand column of Table 2–3 should be identical to the right hand column of Table 2–1.

(b) A table identical to Table 2–3 should be developed for each major work item. An example of a table for the major work item of Wastewater Management is labeled Table 2–3a. Summarizing all of the entries in these tables for each major work item in the study will generate the input for Tables 2–1, 2–2,

and 2–3. Consequently, these tables should be some of the first tables developed after the allocated study cost, Table 2–6, is determined.

(c) A specific series of tables, Table 2–4 will be developed only for the wastewater management major work item. The row and columnar headings and "Work Element/Descriptions" in the POS must be identical to those contained in Table 2–4, because of para 2–6.a.(1).

(d) A series of seven tables, Table 2–5, for each major work item shall be developed if formally requested on a case-by-case basis of HQDA (DAEN–CWP–U), WASH DC 20314. In no case shall the format of Table 2–5 be used as a substitute for the format specified for wastewater management in Table 2–4. However, Table 2–5 for wastewater management may be required in addition to Table 2–4.

(2) *Cost Allocation.* Particular attention must be given to allocating wastewater management costs, because of the potential which wastewater management has for concurrently solving other urban water resource problems. The cost to be allocated to wastewater management shall be based on an equitable distribution of total urban study costs among all major work items. The procedure to be followed in allocating the urban study costs to each major work item is a modified form of the Separable Costs-Remaining Benefits (SCRB) method now being used for project construction cost allocation. In no case shall any other procedure be used without specific written approval from HQDA (DAEN–CWP), WASH DC 20314. The above shall not be construed to supersede or replace existing project cost allocation procedures. Table 2–6 (located at the end of this chapter) shall be used to allocate urban study costs as follows:

(a) The single purpose study cost for each major work item, xi, without regard for any multiple purpose problem solutions is estimated and entered in line 1.

(b) Estimate the cost to solve all major work items through multiple purpose planning. This is the total urban study cost (USC). The USC is the total estimated cost of the study to include Federal and non-Federal efforts.

(c) For each major work item, xi, estimate the cost to solve all other remaining x through multiple-purpose planning. Enter this value, (N–1), in line 2.

(d) The separable study cost of each major work item is estimated and entered in line 3. The separable cost for each major work item, xi, is determined by subtracting from the USC, the cost estimated in line 2, above.

(e) The individual remaining study cost is the difference between the single purpose study costs, line 1, and the separable study costs, line 3. This value is entered in line 4.

(f) The ratio of the remaining study cost for each major work item, xi, line 4, to the sum of all remaining study costs, w, is calculated and entered in line 5.

(g) The total joint study cost, y, is the difference between the USC and the sum of all separable costs, v.

(h) The total joint study costs, y, is distributed to each xi by multiplying y times the ratio of remaining study cost for each xi, line 5, and is entered in line 6.

(i) The allocated study cost for each major work item is the sum of the separable cost, line 3, and the individual joint study cost, line 6, for each major work item. The allocated study cost for each xi is entered in line 7. The allocated study cost for each major work item should be entered in the bottom line of Table 2–1, the right hand column of Table 2–2, and the lower right entry in Tables 2–3a,b,. . ., i.

(j) The total allocated study cost, z, must be equal to the total urban study cost, USC. This is a useful check on the cost allocation process.

(k) Table 2–6 should not be reproduced in the POS. Its primary value is as a worksheet for the cost allocation process. Table 2–6, along with the supporting tables used to generate the estimates, will be kept in the files of the study office. This information should be available for review at the second OCE and Division review meeting held after beginning the POS. Table 2–4 may be used to assist Corps planners in the development of single purpose costs for wastewater management. Other major work items are traditional Corps roles and should present much less of a problem than the initial single purpose wastewater management cost derivation. Completing the wastewater single purpose estimate first will also save effort in developing (N–1) costs, subpara(b), above. Based on total allocated costs for wastewater management, line 7 Table 2–6, the single purpose entries can be modified to multiple purpose entries for inclusion in the POS.

(3) *Eligible Costs.* Certain types of funds may not be used to make up the required non-Federal contributions to the wastewater component of urban studies. The non-Federal share may be in terms of services, efforts, and/or cash contributions. Other Federal funds may not be used to make up any part of the non-Federal participation. Revenue-shared funds are not considered Federal Funds for this purpose. The non-Federal share must represent additional new effort specifically required in the conduct of the study. For example, the non-Federal share shall not include costs of data already collected or normally to be collected for an ongoing program, nor shall it include funds used for matching other Federal grants.

(4) *Non-Federal Share Costs for Wastewater Management.* Those non-Federal efforts which are included as separable costs under the wastewater management column on Table 2–6 are countable for cost-sharing purposes. Those non-Federal efforts included as separable costs under any other major work item except wastewater management on Table 2–6 are not countable for cost-sharing purpose. Those efforts which are included in the joint study costs are countable for cost-sharing purposes only up to the amount of the joint study costs allocated to wastewater management. The sum of the countable non-Federal efforts described above must be greater than or equal to 25 percent of the allocated study cost for wastewater management, line 7 on Table 2–6.

2–7. *Plan of Study Coordination.* This section of the POS must reflect in detail, the coordination and public involvement that has taken place during POS preparation. The following subsections will be included.

a. *Stage 1 Public Involvement.* This subsection should document the development and execution of the Stage 1 Public Involvement Program. It should set forth what the public involvement hoped to accomplish, how the involvement was executed, and the modifications in the involvement program that may have been necessary to accomplish the desired end.

b. *Agency Approval.* When completed, the POS will essentially represent a formal agreement with the other participants in the study. Therefore, work tasks, schedules, and cost allocations, particularly for wastewater management, will be coordinated with all study participants. Letters of assurance shall be obtained from each and every study participant which confirm that efforts and costs allocated in the tables to specific study participants will be provided. These letters will be reproduced in Appendix B of the POS. If written responses are not available, the situation should be discussed in detail.

2–8. *POS Review.* The POS will be reviewed within the Corps in two steps. The first review will be conducted prior to the POS being circulated for an initial public review. The second review will be conducted after agreement is reached on the POS content by the Corps, and the other study participants.

a. ER 1105–2–10 specifies that two on-board review sessions will be held during POS development. Thirty days after funds are received by the field office responsible for the new study HQDA (DAEN-CWP) personnel will conduct a meeting in the field office for District and Division personnel to explain the latest guidance concerning POS content. Guidance on the development of the POS will also be discussed. Approximately 60 days after the first meeting, an on-board review of the POS will be conducted in the field office. Attendees will include HQDA (DAEN-CWP) and Division personnel and may also include representatives of the Office of the Secretary of the Army, HQDA (DAEN-CW-SA). The purpose of this review is to resolve any conflicts in policy and content of the POS before it is transmitted to the public for initial comment. This meeting should facilitate revision by providing higher echelon comments at the time when they are most easily incorporated. Each meeting participant will be furnished copies of the draft POS ten days prior to the meeting.

b. When the POS is completed and letters of assurance are received from all study participants, the District Engineer will formally transmit the POS to the Division for review. Where ongoing studies are reoriented to be handled under the Urban Studies Program, the District Engineer's forwarding letter should set forth the amounts estimated to be spent on other studies within the authority.

c. Divisions shall review POS's generated by their Districts using this chapter as the measurement of sufficiency. After the POS is modified to respond to Division comments, the Division will indorse the POS to HQDA (DAEN-CWP) WASH DC 20314. The applicable Reports Management Branch will coordinate the review and compile all HQDA (DAEN-) level comments. Upon completion of this review, comments and/or approval will be forwarded to the Division. The time period allowed for this review is 30 days from date of receipt of the complete POS by HQDA (DAEN-CWP) WASH DC 20314. Receipt of approval is sufficient authority to begin Stage 2 of the planning process. Information copies of each approved POS will be forwarded to HQDA (DAEN-CW-SA) WASH DC 20314 for possible review by OMB.

TABLE 2-1.—*Total Study Costs by Major Work Item and Effort Component*

Effort components	Work items							
	Flood control and flood plain management	Lake, ocean and estuarine restoration and protection	Wastewater management	Water supply management	Navigation (commercial and recreational)	Water related recreation	Conservation of fish and wildlife resources	Total for effort component
1. Preparation of a plan of study								
2. Plan formulation and Evaluation								
(a) Problem identification								
(b) Formulation of alternatives								
(c) Impact assessment and evaluation								
(d) Public involvement and institutional studies								
3. Study documentation and report preparation								
4. Study management								
Total for work item								

NOTE.—All table entries should be in thousands of dollars (10^3). TABLE 1-2 contains a conceptual combined effort breakdown for a 3-year study period. Total study costs equal total combined efforts equal all Corps efforts plus all other Federal efforts plus all non-Federal efforts plus all non-Corps of Engineer dollars disbursed in lieu of providing efforts. Effort equals person-years of work multiplied by the annual cost of employing a person with a specified level of expertise.

TABLE 2-2.—*Federal and Non-Federal Efforts by Major Work Item*

SUMMARY

[Cost in thousands of dollars]

Major work items	Federal		Non-Federal		Total for major work items	
	Man-years	cost	Man-years	cost	Man-years	cost
Flood control and flood plain management						
Lake, ocean and estuarine restoration and protection						
Wastewater management						
Water supply management						
Navigation (commercial and recreational)						
Water related recreation						
Conservation of fish and wildlife resources						
Totals						

TABLE 2-3.—FEDERAL AND NON-FEDERAL EFFORTS SUMMARY

[Cost in thousands of dollars]

Effort component	Federal		Non-Federal		Total for effort component	
	Man-years	Cost	Man-years	Cost	Man-years	Cost
1. Preparation of a plan of study						
2. Plan formulation and evaluation						
(a) Problem identification						
(b) Formulation of alternatives						
(c) Impact assessment and evaluation						
(d) Public involvement and institutional studies						
3. Study documentation and report preparation						
4. Study management						
Total						

NOTE.—A similar table will be developed for each major work item. Table 2-3a, next page is an example.

TABLE 2-3a—*Work item: Wastewater Management, Federal and Non-Federal Efforts*

[Cost in thousands of dollars]

Effort component	Federal		Non-Federal		Total for effort component	
	Man-years	Cost	Man-years	Cost	Man-years	Cost
1. Preparation of a plan of study						
2. Plan formulation and evaluation						
(a) Problem identification						
(b) Formulation of alternatives						
(c) Impact assessment and evaluation						
(d) Public involvement and institutional studies						
3. Study documentation and report preparation						
4. Study management						
Total for effort						

NOTE.—A similar table should be developed for each major work item. Developing this table for wastewater management does not fulfill the same requirement set forth in table 2-4. Both tables must be developed although some information is duplicated.

TABLE 2-4.—*Federal and non-Federal effort (summary)*

	Federal		Non-Federal		Total	
	Man-years	Cost ($10³)	Man-years	Cost ($10³)	Man-years	Cost ($10³)
A. Public involvement program						
B. Data collection and projection for economics, water quality, environmental and land use						
C. Development of alternative basin and areawide plans						
D. Evaluation, comparison, and selection of basin and areawide plans						
E. Implementation arrangements, including institutions needed for managing, financing, planning, construction, operation, and maintenance						
F. Report preparation						
Totals						

NOTE.—Table 2-4 applies "Only" to the wastewater management major work item. All other major works items do not need a similar table constructed unless formally requested by HQDA (DAEN-CWP), Wash., D.C. 20314. In the event that a field office is formally requested to develop a similar level of detail on a major work item other than wastewater management, the format contained in table 2-5 will be used.

TABLE 2-4a.—*Federal and Non-Federal Effort Public Involvement Program*

Work element/description	Responsible agency	Cost		Completion date
		Man-years	$10³	
	(1)	(2)	(3)	(4)
1. Develop a public involvement program plan	Agency entry should be Corps of Engineers, or an agency name. Code agency name with (F) or (NF) to denote Federal or non-Federal agency, respectively.			
2. Compilation of mailing list of individuals and organizations				
3. Arrangements for meeting places				
4. Personnel to conduct workshops				
5. Personnel to do work with news media				
6. Preparation of public announcement				
7. Preparation of brochures, newsletters, etc				
8. Development of plan of study				
Total:				
Federal				
Non-Federal				

TABLE 2-4b.—*Federal and Non-Federal Effort, Data Collection and Projection*

Work element/description	Responsible agency	Cost		Completion date
		Man-years	$10³	
	(1)	(2)	(3)	(4)
1. Historical and projected population and economic data on a county basis:				
(a) Urban and rural population				
(b) Industrial employment by 2 and 3 digit SIC				
(c) Agricultural crop acreage and type of cropping				
(d) Compare with OBERS projections				
2. Historical and projected water use and facilities on a county basis:				
(a) Municipal				
(b) Industrial by census industrial sector				
(c) Irrigation				
(d) Review and adjust where necessary				
3. Historical and projected waste sources and facilities showing flow rate, constituents and concentrations:				
(a) Public and municipal				
(b) Industrial				
(c) Irrigation return flows				
(d) Oil and gas field operations				
(e) Urban and rural storm runoff				
(f) Sanitary landfills				
(g) Open dumps				
(h) Field collection and analysis of water quality data where none available				
4. Existing and projected land use plans:				
(a) Adopted land use plans				
(b) Best estimates where none exist				
5. Surface water quality data:				
(a) Description of data needed				
(b) Prepare map showing monitoring stations				
(c) List water quality parameters monitored				
(d) Inventory existing violators				
(e) Identify, locate and obtain additional data				
6. Stream standards:				
(a) Description of existing standards				
(b) Identification of inadequacies, if any				
(c) Tentative revised standards by stream reach and for all necessary parameters				
7. Water rights criteria or constraints that may affect design of upstream treatment systems				
8. Groundwater quality and quantity:				
(a) Availability by county and/or aquifer from existing sources with refinements where possible.				
(b) Recommend areas which should be considered for groundwater recharge with treated wastewater.				
9. Provide data on existing significant botanical, zoological, archeological, and historical basin features.				
10. Review, select and implement a data handling and storage program				
11. Data and inventory assessment:				
(a) Assess for validity				
(b) Assess for coverage				
(c) Determine data gaps				
(d) Prepare program for incremental data acquisition				
(e) Provide a complete inventory of data source				
Total:				
Federal				
Non-Federal				

TABLE 2-4c.—*Federal and Non-Federal Effort, Development of Alternative Basin and Areawide Plans*

Work element/description	Responsible agency	Cost		Completion date
		Man-years	$10[3]	
	(1)	(2)	(3)	(4)
1. Identify and designate the wastewater management planning areas				
2. Basin model:				
(a) Review, test, select and adopt model				
(b) Adapt, verify and refine model to river basin conditions				
3. Alternatives to be developed:				
(a) Develop wastewater management alternatives for each areawide planning area and for the basin to meet 2 goals:				
(1) Highest levels of wastewater treatment				
(2) Meet current requirements				
(b) Alternatives to be developed include the following:				
(1) Land Treatment				
(2) Biological and physical-chemical				
(3) Combinations of (1) and (2) including nonstructural				
(c) Existing wastewater management plans will be utilized in developing 1 or more of the above alternatives				
Total:				
Federal				
Non-Federal				

TABLE 2-4d.—*Federal and non-Federal efforts, evaluation, comparision and selection of basin and areawide plans*

Work element/description	Responsible agency	Cost		Completion date
		Man-years	$10[3]	
	(1)	(2)	(3)	(4)
1. Assess benficial and adverse impacts of alternative areawide and basin plans:				
(a) Economic				
(b) Environmental				
(c) Social				
(d) Water rights				
(e) Institutional/financial capabilities				
2. Compare performance of alternative plans				
3. Select areawide and basin plan				
Total:				
Federal				
Non-Federal				

TABLE 2-4e.—*Federal and Non-Federal Effort, Implementation Arrangements*

Work element/description	Responsible agency	Cost		Completion date
		Man-years	$10[3]	
	(1)	(2)	(3)	(4)
1. Prepare construction schedules for each of the wastewater planning subareas to meet the highest priority short range basin goals				
2. Develop and recommend appropriate institutional arrangements for:				
(a) Execution of advanced engineering and design and construction				
(b) Operation and maintenance				
(c) Major replacements				
(d) Continuing planning and management responsibility				
3. Develop and recommend financing and cost sharing arrangements				
4. Planning committee adopts certifiable plan				
Total:				
Federal				
Non-Federal				

TABLE 2-4f.—*Federal and Non-Federal Effort, Report Preparation*

Work element/description	Responsible agency	Cost		Completion date
		Man-years	$10[3]	
	(1)	(2)	(3)	(4)
1. Report preparation				
Total:				
Federal				
Non-Federal				

TABLE 2-5: (Initials of Work Item) *Federal and Non-Federal Efforts by Work Task*

[Cost in thousands of dollars]

MAJOR WORK ITEM: (SPECIFY)

EFFORT COMPONENT: (SPECIFY)

Work task	Federal				Non-Federal			
	Responsible agency	Man years	Cost	Completion date	Responsible agency	Man years	Cost	Completion date
1:								
2.								
:								
:								
:								
n. Specify as appropriate in detail to insure no duplication of efforts.								
Totals								

NOTE.—A table should be developed for the following effort components:
1. Preparation of a plan of study
2a. Problem identification
2b. Formulation of alternatives
2c. Impact assessment and evaluation
2d. Public involvement and institutional studies
3. Study documentation and report preparation
4. Study management

The format in table 2-5 will be used in the event that a field office is formally requested by HQDA (DAEN-CWP) Wash., D.C. 20314 to develop a similar level of detail to table 2-4 on a major work item other than wastewater management.

TABLE 2-6.—*Urban Study Cost Allocation Worksheet*

	Major work item, x_i				
	Flood control	Wastewater management	Water supply	Water based recreation	Total Σ of line entries
1. Single purpose study cost					Not applicable.
2. Multiple purpose minus 1 major work item study cost					Do.
3. Separable study cost, USC–Line 2					v.
4. Remaining study cost, line 1–Line 3					w.
5. Ratio of remaining study cost, remaining study cost for x_i/w					1.00.
6. Individual joint study cost, (y) x (x_i ratio from line 5)					y.
7. Allocated study cost, line 3 plus line 6					z.

Legend:
Σ="The sum of".
x_i=A specific major work item.
USC=Urban Study Cost. USC is not equal of line 1, single purpose study cost. USC is the amount of money and effort from both Federal and non-Federal sources, available for the total multiple purpose study. USC=z equal the total cost to be allocated.

CHAPTER 2

Public Involvement in the Urban Studies Program

2-9. *Purpose.* a. The purpose of this chapter is to define the role of public involvement in the Corps' Urban Studies Program. Procedures for developing and executing an effective program are discused.

b. Public Involvement is a continuous, two-way communication process which involves—

(1) Promoting full public understanding of the manner and means by which water resources problems and needs are investigated and solutions are proposed.

(2) Keeping the public fully informed regarding the status and progress of studies and the results and implications of planning activities.

(3) Actively soliciting from the public their opinions and perceptions of problems, issues, concerns, and needs, their preferences regarding resource use and alternative development or managerial strategies, and any other information and assistance relevant to the planning process.

2-10. *Importance of Public Involvement.* The importance of a comprehensive public involvement effort fully integrated with the planning process cannot be overemphasized. Application of the objectives, development techniques, activities and monitoring and evaluation procedures described in this chapter will provide the basis for conducting an effective public involvement program in an open planning process. While a public involvement program is essential, it does not replace sound planning and engineering. In the final analysis, the results of planning must reflect a combination of both professional expertise and public input.

2-11. *Public Involvement Objective.* a. The primary objective of public involvement is to provide sufficient information to local, state and regional officials, influentials and opinion leaders, and the public-at-large to obtain their input regarding problem identification, articulation of planning objectives, formulation of alternatives, impact assessment and evaluation.

b. In order to accomplish this objective, the public involvement program should, as a minimum—

(1) Present information which will assist the public in defining its water resources problems, issues, concerns, and objectives, and in understanding Corps planning responsibilities, how the planning process works and how to achieve effective participation.

(2) Actively promote effective coordination and exchange of information between the Corps' planning effort and the plans and programs of other Federal, State and local agencies.

(3) Develop channels of communications through which the public can express its preferences.

(4) Provide structured opportunities for the public to influence the planning process, to identify and clarify conflicts, and to achieve if practicable, consensus regarding a course of action.

2-12. *Development of a Public Involvement Program.* a. A flexible public involvement program or strategy should be developed which can be monitored and modified as necessary to conform as closely as possible to the changing needs and desires of the publics.

b. Planning for public involvement shall begin during the preparation of the Plan of Study. The POS shall include a general strategy for public involvement throughout the study, an initial definition of the publics to be included, and contingency plans for implementation. After approval of the POS, a more detailed plan for implementation shall be developed. This plan shall include specific public involvement activities to be undertaken, and shall identify opportunities for monitoring and modification throughout Stages 2 and 3.

c. The specific public involvement objectives and activities described for each of the four functional planning tasks are contingent upon the particular stage of the planning process. This requires the overall public involvement program be uniquely designed to address a particular stage and task.

d. During problem identification, specific regional or local problems of public concern are identified. Unless there is general agreement that problems have been adequately identified, it will be difficult subsequently to achieve consensus as to whether alternative plans have properly addressed the region's problems. Specific public involvement objectives and activities during problem identification should include the following—

(1) Inform and educate the general public and specific publics about the study effort being undertaken.

(2) Obtain data which will assist in the identification and description of resource management problems, concerns and opportunities.

(3) Obtain information concerning public preferences for their desired future conditions and desired levels of problem resolution.

(4) Obtain some indication of the relative priority of planning objectives.

(5) Obtain public review of and reaction to results of the problem identification task.

e. Public involvement during formulation of alternatives should be oriented toward assuring that the alternatives developed address the full range of problems and concerns of the study area, and that plans are responsive to the planning objectives. Specific public involvement objectives and activities during the formulation of alternatives should include the following—

(1) Inform the public and obtain their feed back about the various technological and managerial measures available for meeting the planning objectives.

(2) Obtain public review of and reaction to results of the formulation task.

f. Public involvement during impact assessment focuses on identification and measurement of impacts. The information necessary to accomplish this is a function of substantial public involvement. An effective public information program is required to assure that understanding of the alternatives and their potential impacts is sufficient to result in meaningful evaluation. Specific public involvement objectives and activities during impact assessment should include the following—

(1) Obtain public reaction to the types of impacts likely to be associated with alternative plan elements.

(2) Obtain information about interest groups primarily concerned with each class of impacts in order to identify those groups and individuals to be specifically consulted during evaluation.

(3) Measure and describe these impacts.

(4) Describe the elements and impacts of each alternative plan to obtain public input on the significance of impacts to each affected interest group.

g. Evaluation is a trade-off process which results in a ranking of alternative plans, and ultimately, in making a choice as to the most desirable alternative(s). Success with this task is more highly dependent on obtaining indications of public preferences than possibly any other phase. Decisions are required which the planner cannot and should not make. For example, trade-off between local and regional beneficial/adverse impacts, or individual and community beneficial/adverse impacts, or achievement of one objective to the detriment of another objective are a public responsibility. Public decisions and preferences must be carefully recorded and included as the basis for modification of the existing alternatives. However, the planner will be ultimately responsible for the quality and utility of the results. Specific public involvement objectives and activities during the evaluation of alternative plans should include the following—

(1) Obtain information concerning acceptability of alternative plans.

(2) Provide forum for public discussion of trade-offs.

(3) Obtain data necessary to screen or rank alternatives in terms of their contribution to planning objectives.

(4) Summarize information on the evaluation of alternative plans. Every effort should be made to reach as wide a spectrum of the public as possible, and to tailor the information process to the requirements and capabilities of the various publics.

2-13. *Public Involvement Program Activities.* The following activities should be used to satisfy the objectives discussed in para 2-12, above.

a. Identification of Publics. Identification of the various publics, particularly those likely to be impacted, is critical to effective planning. As it is highly unlikely that even the most comprehensive public involvement program will reach more than a small percentage of study area residents, an effort should be made to assure that certain key groups and individuals are identified, contacted, and encouraged to participate. Particular attention should be given to many of the special interest groups and most of the unorganized public, who will become actively involved in a study only after the immediate impacts of alternative plans are evident to them. In order to achieve a cross-section of public sentiment and adequate visibility, major emphasis during early planning should be on obtaining input from representative segments of the public including elected officials, agency representatives, and leaders of special interest groups. Periodically, the list of participants should be reviewed, modified, and expanded as the study moves through succeeding steps of the planning process. In recognition of the difficulty of achieving early, widespread, general participation, a well-designed, comprehensive public information program should be an integral part of public involvement programs. Table 2-7 illustrates one way of categorizing the public.

b. Defining Information Requirements. Information is the force which drives the planning process and which ties the various planning activities together. Accordingly, it is necessary to determine what information should be exchanged at what points in the planning process in order to facilitate planning, related public involvement and decisionmaking. The planner should attempt to specify this information and to provide the methods and settings having the greatest potential for achieving the communication.

(1) Planning information can be categorized as either substantive or procedural. Substantive information concerns problems, needs, issues, concerns, and the range of measures used for solving problems, and public values and preferences. Procedural information concerns the structure of the planning process, its relationship to the public involvement program, and the role of public involvement.

(2) The public must understand the basic procedural information before they can make any effective contribution of substantive information. A deficiency in providing procedural information will make effective public involvement virtually impossible. Information of a substantive nature will be developed by both the Corps and the public. It is important that this information be shared and similarly understood by all study participants.

c. Definition of Public Involvement Techniques. There are numerous techniques available for designing a public involvement program. These can be divided into three general functional categories. Table 2-8 contains some examples of these techniques.

(1) The information-education function can be treated as a single, on-going process with the objective of providing information to the public that will be necessary to achieve effective public involvement.

(2) The interaction-dialogue function includes those techniques which provide the degree of two-way communication necessary for information exchange in planning.

(3) The review-reaction technique is important in view of the fact that in even the most comprehensive public involvement program, only a small percentage of the public will have been contacted and interacted with directly. The most common means of review-reaction is the public meeting, which is an integral part of all public involvement programs. Public hearings may also fall into this group. Hearings will be conducted where required according to established procedures.

d. Selection of Public Involvement Techniques. Selection of a specific technique is contingent upon the following considerations.

(1) The scope and specificity of focus, such as how many people and what types of people are involved.

(2) The degree to which it involves one-way versus two-way communication of information.

(3) The degree to which it assumes agency initiative for action, public initiative for action, or both.

(4) The agency resources in terms of staff and time commitment which are required for successful use of the technique.

2-14. *Monitoring of Public Involvement Programs.* a. As planning progresses, there is a need for continuous monitoring and adjustment of the public involvement program to assure responsiveness to public concerns and issues, to maintain public interest, and to facilitate active public involvement throughout.

b. Monitoring can take several different forms. One form is through news media content analysis. Another form is through first-hand experience is observing results of public involvement activities, such as workshops, briefings, news conferences, and the like. Finally, public meetings serve a useful purpose in the monitoring process.

2-15. *Evaluation of the Public Involvement Program.* The systematic delineation of objectives, target publics, public involvement activities, and constraints should result in the development of a public involvement program tailored specifically to a particular planning effort. However, it should be recognized that public involvement is a dynamic process occurring in a changing sociocultural setting. Thus, while it is desirable to have an overall strategy in mind at the beginning of a study, it will also be necessary to maintain flexibility. Active monitoring should put the planner in a position where adequacy of the program can be evaluated and the program modified whenever the need arises.

TABLE 2-7

IDENTIFICATION OF THE PUBLICS

I. *Governmental Sector*
a. *Elected Officials*
State Governors
Congressional Delegations
State Legislators
Mayors
City Councils
County Commissioners
Other
b. *Agency Representatives*
Federal Agencies:
Department of Agriculture
Department of Housing and Urban Development
Department of the Interior
Environmental Protection Agency
Other
State Agencies:
Natural Resources
Housing
State Planning
Public Health
Economic Development
Agriculture
Other
Regional Agencies:
River Basin Commissions
Council of Governments
Regional Planning
Economic Development
Other

Local Agencies
Public Works
Planning
Water Supply
Wastewater Management
Irrigation Districts
Public Health
Other

II. *Special Interest Groups*

a. Environmental Groups such as the Sierra Club, Audobon Society, Friends of the Earth, and Isaac Walton League.

b. Industrial Representatives and Trade Associations.

c. Labor Groups.

d. Business and Commercial Interests such as the Chamber of Commerce.

e. Organized Farm groups such as Grange, and Co-operatives.

f. Public Utilities.

g. Community Service Groups such as League of Women Voters, Lions Club, Kiwanis, and Fraternal and Civic Associations.

h. Professional Groups such as American Society of Civil Engineers, Society of American Foresters, and Sprinkler Irrigation Association.

i. Educational Institutions, Faculty and Students.

j. Special Purpose Groups such as Watershed Associations, Neighborhood Civic Associations, Irrigation and Drainage Districts.

k. Other.

III. *General Public*

a. Owners and occupants of domestic and commercial property which may be directly affected by alternative plans.

b. Owners and occupants of property indirectly affected by alternative plans.

c. Interested Citizens not in a. or b. above.

d. Sensitive ethnic or economic groups.

e. Other.

TABLE 2-8.—*Public Involvement Mechanisms by Primary Functional Orientation* [1]

Information-education	Interaction-dialogue	Review-reaction
Press releases	Workshops	Public meetings
News conferences	Informal contacts	Public inquiry
Brochures	Advisory groups	Questionnaire
Newsletters	Task groups	Sample surveys
Speeches and presentations to organized groups	Seminars	Public hearings
Field trips	Interviews	
Exhibits	Study group discussions	
Reports		
Local information centers		
Radio-TV programs and spot announcements		
Letters		
Briefings		
Films		
Paid ads		
Journal articles		
Demonstration projects		

[1] Adapted from; Warner, Katerine P., *Public Participation in Water Resources Planning*, (National Water Commission: National Technical Information Service) July 1971.

CHAPTER 3

Institutional Analysis and Arrangements

2-16. *Purpose.* The purpose of this chapter is to establish the framework for performing institutional analysis and presenting institutional arrangements.

2-17. *Relationship of Institutions to Urban Studies.* An institution is a process or organization that is highly structured, systematized and stable. It may grow out of mores such as common law, or be consciously created such as constitutional law. An institution may be a type of group, or it may be a formalized practice or procedure. Applying these definitions to water resources planning, and particularly to urban studies, the result is a focus for institutional analysis that includes not only organizations such as planning agencies, water commissions, and special interest groups, but also the processes and relationships that are involved such as home rule, tax structures, and increased financial obligations. Substantial public involvement is essential in performing the latter part of this analysis, inasmuch as public attitudes interact heavily with these non-organizational institutions. Institutional analysis is the process whereby institutions directly or indirectly related to water resource planning and management, are identified and their capability to implement alternative plans is assessed. Institutional arrangements are those tasks or procedures which suggest how existing institutions should be utilized, modified, new institutions created, or existing institutions abandoned in order to facilitate implementation of the plan.

2-18. *Task Areas.* Institutional analysis parallels the overall planning process, moving from broad data collection to detailed specification of arrangements. Analysis is composed of three major task areas, which are listed below and discussed in paragraphs 2-19 through 2-21.

a. Establishment of an institutional data base.

b. Analysis and evaluation of institutional capabilities versus the requirements of an alternative plan.

c. Presentation of alternative institutional arrangements as part of the implementation program.

2-19. *Institutional Data Base.* Establishing the necessary data base entails the identification and description of a cross-section of relevant institutions. The description of institutions should concentrate on financing capabilities, legal authorities, programs and policies, existing capabilities to implement programs for management and capital facilities, and availability of competent personnel in formal organizations and agencies, as well as widespread attitudes and local customs relevant to water resources planning. If a survey exceeding ten contacts is required, HQDA (DAEN-CWP) WASH DC 20314 must be contacted prior to the survey. Briefly, the Office of Management and Budget must approve all surveys exceeding ten contacts.

2-20. *Analysis and Evaluation of Institutional Capabilities.* a. This task is the core component of the institutional studies. It involves the analysis of institutional requirements imposed by alternative plans and the capability of existing institutions to meet these requirements.

b. In Stage 2 the requirements that plans would place on existing institutions should be identified. Particular attentions should be given to the following items.

(1) Formal organizations and agencies.

(2) Powers and authorities of existing institutions, to include legal bases and considerations in both functional and geographic areas.

(3) Major programs and policies of existing institutions.

(4) Regional financing capabilities.

c. As planning continues, the capability of existing institutions to implement alternative plans is assessed. This assessment may lead to the conclusion that some new institutions will be required in order to implement some or all alternative plans. Because institutional studies are an integral part of plan formulation and evaluation, they must be considered along with social, economic, environmental, and technical impacts throughout the planning process.

d. Active public involvement is essential to accomplish this task. Interest groups and community groups can be of particular value in assessing the potential for change. Moreover, given the definition of public as an any non-Corps of Engineers entity, organizations are publics. The inclusion of these publics in the planning process will provide critical input to the institutional analysis.

2-21. *Presentation of Institutional Arrangements.* Each alternative urban water resources plan must contain at least two alternative implementation arrangements, which may require the presentation of two different institutional arrangements. Those institutional arrangements peculiar to a specific capital improvement or management program should be included in the discussion of that component. Those arrangements concerning the entire plan, should be discussed in an overview paragraph. One implementation arrangement may be used to implement more than one plan. For instance, plan A may have implementation arrangements X and Y. But arrangement X may be used by plans A, C, D, and E whereas arrangement Y may be used by plans A, B, D, and F.

PART THREE

CHAPTER 1

Water Quality Goals and Deadlines for Wastewater Planning

3-1. *Purpose.* The purpose of this part is to provide guidance concerning water quality standards, goals, and deadlines to be used in developing the wastewater management components of alternative urban water resource plans.

3-2. *National Goals.* a. Pub. L. 92-500 establishes two national water quality goals in section 101(a). These goals are:

(1) "It is the national goal that the discharge of pollutants into the navigable waters be eliminated by 1985."

(2) "It is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by 1 July 1983."

b. The wastewater management components of urban water resource plans will satisfy these national goals through the timephased achievement of various effluent limitation deadlines for publicly owned treatment works (POTW's) and non-POTW's. Table 3-1 relates the name of effluent limitations deadlines, and their acronyms, established in section 301 of § 264.3(a) to the dates by which they must be achieved.

3-3. *Effluent Limitation Deadlines.* a. Secondary Treatment. Information defining secondary treatment in terms of water quality criteria was published as 40 CFR 133 in 38 FR 22298-22299 on 17 August 1973. POTWs in existence on 1 July 1977 or approved pursuant to section 203 of Pub. L. 92-500 prior to 30 June 1974 must achieve secondary treatment. Any more stringent effluent limitations established to meet subparagraphs (1) through (4), below, must be achieved not later than 1 July 1977.

(1) State water quality standards.

(2) Treatment standards.

(3) Schedules of compliance established pursuant to any State law or regulations under authority preserved by section 501 of Pub. L. 92-500.

TABLE 3-1.—*Effluent limitation deadlines*

Source of wastewater	Dates	
	1977	1983
Publicly owned treatment works (POTW).	Secondary treatment	Best practicable waste treatment technology (BPWTT).
Nonpublicly owned treatment works (Non-POTW).	Best practicable technology currently available (BPT).	Best available technology economically achievable (BAT).

NOTE.—POTW's are frequently referred to as "Municipal" treatment plants. An example of Non-POTW's are industrial treatment plants.

(4) Any other Federal law or regulation required to implement any applicable water quality standard established by Pub. L. 92-500.

b. Best Practicable Technology Currently Available (BPT). By 1 July 1977, non-POTW must achieve BPT. Information defining BPT is being published on an industry-by-industry basis. Thirty categories of industrial discharges have been identified, many containing several subcategories. Effluent limitations regulations for these categories are being published in the Title 40 CFR series as Parts 405 through 435. Pretreatment requirements for compatible pollutants in existing industrial discharges to POTW are described in 40 CFR 128, 38 FR 30982-30985, 8 Nov. 73. In addition to specifying effluent limitations allowing direct industrial discharge to navigable waters, regulations 40 CFR 405 through 435 also specify pretreatment requirements needed for—

(1) Incompatible pollutants discharged from existing industries to POTW.

(2) New source industrial discharges to POTW.

c. Best Practicable Waste Treatment Technology (BPWTT). Not later than 1 July 1983, all POTW must provide for the application of BPWTT over the life of the treatment works. A Notice of Availability of an EPA proposed report titled Alternative Waste Treatment Management Techniques and Systems for BPWTT was published in 39 FR 11135, 25 Mar. 74. The proposed report is available from EPA Regional Offices, as will be the finalized version. Corps field offices should coordinate with applicable State officials and EPA Regional Office personnel to develop an acceptable definition of water quality criteria achievable by and commensurate with BPWTT. Additionally, no funds may be provided under section 201 of Pub. L. 92-500 after 30 June 1974 unless the grant applicant can show that—

(1) Alternative waste management techniques have been studied and evaluated.

(2) The treatment works proposed meet BPWTT as defined by the information on alternative waste management techniques available per 39 FR 11135.

(3) As appropriate, the treatment works allow to the extent practicable, the application of technology for water recycling, reclamation, or the elimination of pollutant discharges at a later date.

d. Best Available Technology Economically Achievable (BAT). By 1 July 1983, non-POTW must apply BAT to their treatment works. Information on effluent limitations for BAT is provided in the same regulations as is information on BPT (40 CFR 405 through 435).

3-4. *The Corps of Engineers' Definition of Effluent Limitations Commensurate With the 1985 Goal.* a. Paragraph 3-2a sets forth the 1985 national goal. Until such time as the Administrator of EPA publishes effluent limitations commensurate with this national goal, the Corps of Engineers' interpretation of this goal shall be used for planning in the Urban Studies Program. The principal reason for continuing to plan for the 1985 goal is to protect the Federal interest. The Federal financial cost (75 percent of total construction cost under section 201 of Pub. L. 92-500) of proceeding directly from the 1977 deadline to the Corps of Engineers' definition of the 1985 goal may be significantly different than the financial cost of proceeding from the 1977 deadline to the 1983 deadline and then to the Corps of Engineers' definition of the 1985 goal. Because insufficient information is available to indicate which pathway to the 1985 goal best serves the Federal interest from a financial viewpoint, as well as from an environmental and social viewpoint, the Corps will develop alternative plans to achieve the 1985 goal using both pathways. Information generated by the Urban Studies Program in this regard will assist the National Commission on Water Quality, convened under section 315 of Pub. L. 92-500, in fulfilling its mission.

b. Several concepts guided the development of the Corps' definition of effluent limitations commensurate with the 1985 goal.

(1) Stream assimilative capacity should not be used to provide the final degree of treatment. The point discharges should be of the necessary quality to reflect the elimination of pollutant discharges. This, combined with the minimization of non-point source problems would eventually permit the stream to cleanse itself and return to a non-degraded condition.

(2) Recognizing that most substances are essential in certain quantities, double distillation-type treatment was ignored. Water of this type would be too pure to permit a balanced, indigenous population of fish, shellfish and wildlife. Therefore, calcium present at 3 or 4 mg/l may be necessary for the survival of an aquatic organism, whereas over 30 mg/l may cause an adverse environmental impact. The critical level where the constituent calcium becomes a pollutant was set at 30 mg/l.

(3) All water should be reserved for multiple use, to include potable supply, recreation, fish and wildlife habitat, irrigation and stock watering. Because of the spectrum of qualities peculiar to specific industries, industrial supply requirements were not explicitly considered. However, a source meeting potable supply requirements would generally be more favorable to an industry than the existing condition in a degraded area.

(4) These concepts ultimately led to the development of a list of constituents and the critical levels above which they become pollutants for each of the following uses.

(a) Potable Supply.

(b) Crop Irrigation.

(c) Livestock Watering.

(d) Full Body Contact Recreation.

(e) Fish and Wildlife Habitat (Freshwater).

c. The list of constituents and critical levels was established after a thorough search of the literature cited in subpara 1, below. The principle reference was subpara 1 (5), below. To reflect concept (3) above, the most stringent level from among the five uses was chosen as the definition of the 1985 goal for each constituent. These reflect the desirable upper limits in "fresh water" in the absence of knowing the natural background levels. In some instances, these levels may be less appropriate for marine and estuarine waters.

d. To remedy potential conflicts between natural background levels and the levels promulgated below, an environmental scan will be used to adjust the critical levels. An environmental scan is a preliminary assessment of the impact of the quality of water specified below on the existing condition of water courses. Where an adverse environmental impact occurs, the critical level may be adjusted. For example, the level of Total Dissolved Solids less than 500 mg/l may cause significant adverse environmental impact to oyster production in an estuary. Accordingly, the Total Dissolved Solids level may be adjusted upwards to retain a viable oyster industry. In no case shall a "technological scan" be conducted with critical levels being revised upwards on the basis of whether or not a conventional sewage treatment process can achieve the constituent levels specified below.

e. The critical levels for constituents shall be based upon the natural background levels of the watercourse or aquifer into which the wastewater effluent is discharged, with specific exceptions of constituents that are highly toxic or otherwise injurious to the environment at trace levels. These levels shall apply as the program technical water quality goal with the two exceptions.

(1) If current state water quality standards are more stringent, those state standards shall apply.

(2) An environmental scan provides a basis for allowing levels of constituents that are higher than natural background levels but not highly toxic, or otherwise injurious to the environment, para (d) above.

f. These constituents should be absent from the wastewater effluent at discharge because of their toxicity to the environment at trace levels. The list is based upon limits recommended by the Committee on Water Quality Criteria for water uses such as public water supply, fresh water and marine aquatic habitat, and irrigation. See Table 3-6 located at the end of this chapter for controlling uses.

TABLE 3-2

Arsenic	Pesticides and other synthetic organics
Barium	Phenols
Boron	Selenium
Cadmium	Silver
Chromium	Zinc
Copper	Mercury
Cyanides	
Lead	

(1) Absence of these constituents in wastewater effluent is recommended in view of their risk to public water supply safety and environmental degradation compounded by potential effects of synergism and biomagnification.

(2) Synergism is a complicating interaction, in which two or more compounds acting together may have an effect on organisms greater than the sum of their separate effects. For example, the toxic effects of mercuric salts are accentuated by the presence of trace amounts of copper. Cadmium acts as a synergist with zinc and cyanide in the aquatic environment to increase toxicity. See subpara 1(1), below, pages 8 and 9 for further discussions. The results of the interaction between living organisms and chemical substances are often unpredictable, but such interaction may produce materials that are more dangerous than the initial pollutants. Biological magnification is a chronic effect of toxic pollutants such as heavy metals and pesticides. Inorganic mercury once was thought to settle safely into the bottom sediments when discharged into water. Anaeorbic bacteria are now known to convert inorganic mercury into very toxic and soluble organic mercury compounds, such as methylmercury, which pass through the food chain by aquatic algae and by fish, eventually reaching man. See subpara 1(1) below, page 1 for futher discussions.

(3) In addition, the constituents in Table 3–3 are considered to constitute a potential environmental and hygienic risk such that their absence is desirable, although presence at natural background levels may be permissible based upon an environmental scan.

TABLE 3–3

Antimony	Nickel
Beryllium	Thallium
Cobalt	Tin
Molybdenum	Titanium

(4) In the event that treated wastewater will be discharged into estuarine or marine waters where public water supply or irrigation are not present or anticipated uses over the planning period, the appropriateness of requiring absence of certain of these constituents can be assessed by an environmental scan. The accumulation of these constituents in the aquatic environment and, in particular, the food chain cautions against their dispersal. The Council on Environmental Quality states, " * * * as our knowledge of heavy metals and other toxic substances expands, new problems will become apparent. For example, it has been suggested that other elements such as cadmium and arsenic, may concentrate in highly toxic forms in a fashion similar to mercury," in subpara g(2), page 227. Potential synergism and biomagnification will be considered in the environmental scan.

g. In the absence of determining natural background levels or conditions for a particular watercourse or aquifer, the following levels should assist in determining the maximum acceptable levels for design. These effluent levels may be altered on the basis of the environmental scan. These specified levels are upper bounds. They are not daily average, 7-day average, 30-day average or average annual values.

(1) The constituents in Table 3–4 along with those listed in Tables 3–2 and 3–3 comprise the minimum acceptable group that must be considered in system design in all studies. Other constituents should be considered as appropriate, depending upon characteristics of the region.

TABLE 3–4

Constituent	*Effluent level*
Total Dissolved Solids	Less than 500 mg/l in "fresh" water.
Biochemical Oxygen Demand 5 Day	BOD level less than 5 mg/l. BOD level equal to or less than dissolved oxygen level.
Heat	The level which assures protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in or on the water into which discharge is made.
Color	Less than 15 color units.
Nitrogen as Nitrate —N and Nitrite —N	Less than 4 mg/l total.
Nitrogen as Ammonia —N	Less than 0.5 mg/l.
Total Nitrogen as N	Less than 8 mg/l.
Phosphorus as Total P	Less than 50 micrograms/liter entering a lake; or 100 micrograms/liter entering a flowing stream.
Oils and Greases	Trace.
Fecal Coliform Organisms	Less than 200/100 ml.
Suspended Solids	Less than 5 mg/l.
Dissolved Oxygen	Greater than 5 mg/l.

(2) The constituents in Table 3–5 should be given particular consideration in system design as warranted by their adverse impact on streams receiving effluent or the significance of their presence in the raw influent. The values listed in Table 3–5 should be considered as points of departure in any analysis. An environmental scan is the vehicle for adjusting the values based upon adverse impact on receiving streams and biota. Professional engineering judgment should consider control at the source to reduce raw influent values as an option to wastewater treatment.

TABLE 3–5

Constituent	*Effluent level*
Virus	Inactivated, but present at trace levels.
Surfactants	Trace.
Fecal Streptococci	Inactivated, but present at trace levels.
Tastes and Odors	None offensive.
Flotables	None.
Settleable Solids	Trace.
Volatile Solids	Trace.
Gamma Radiation	Trace.
Alpha Radiation	Less than one pico curie/liter.
Beta Radiation	Less than 100 pico curies/liter.
Turbidity	Less than five Jackson units.
Chemical Oxygen Demand	Less than 10 mg/l.
pH	Between 6.0 and 8.5.
Alkalinity	Less than 100 to 130 mg/l when pH is between 6.0 and 7.0.
Carbon Dioxide	Less than 25 mg/l.
Sulfates	Less than 100 mg/l.
Calcium	Less than 30 mg/l.
Chlorides	Less than 250 mg/l.
Sodium	Less than 10 mg/l.
Magnesium	Less than 125 mg/l.
Fluorides	Varies from 1.7 mg/l at 10° C to .8 mg/l at 30° C.
Aluminum	Less than 1 mg/l.
Bicarbonates	Less than plus or minus 50 mg/l variation over ambient concentrations.
Manganese	Less than 0.05 mg/l.

h. A list of constituent levels considered critical to the environment will be developed in each study for each watercourse receiving treated wastewater. These lists will include a discussion of the derivation of each constituent level and environmental scan, with particular emphasis where levels are higher than those recommended in this document. These lists will be furnished to HQDA (DAEN–CWP) WASH DC 20314, prior to the end of Stage 2.

i. The following seven documents were used as references in the development of paragraph 3–5.

(1) Council on Environmental Quality, Toxic Substances, (Government Printing Office: Washington, D.C.). 1971.

(2) Council on Environmental Quality, Environmental Quality: The Second Annual Report of the Council on Environmental Quality, (Government Printing Office: Washington, D.C.) 1971.

(3) McKee, Jack E. and Wolf, Howard W., Water Quality Criteria, (Resources Agency of California; Sacramento, Calif.), 1963.

(4) Water Quality Criteria, (American Society for Testing Materials; Philadelphia, Pa.), 1966.

(5) National Technical Advisory Committee on Water Quality Criteria, Water Quality Criteria, (Federal Water Pollution Control Administration: Washington, D.C.), 1968.

(6) U.S. Public Health Service, Drinking Water Standards, (Government Printing Office: Washington, D.C.), 1962.

(7) Weinberger, Leon W., Review of Project Technical Aspects, (Environmental Quality Systems, Inc.: Washington, D.C.), Report Number 2, October 1971.

TABLE 3-6.—*Controlling uses requiring absence of toxic constituents*

Constituent	Controlling use(s)	Toxic effects
Arsenic	Public water supply	Arsenic trioxide is exceedingly toxic to most animals. It is cumulative in the tissues of many organisms. In arsenate form, it is an antimetabolite, reacting with proteins and enzymes. It is possible carcinogen in water.
Barium	do	Barium forms a stable precipitate or chelate with essential metabolites, causing toxicity.
Boron	do	Boron is an essential element for plants, but is toxic to most plants in concentrations greater than 1.0 mg/l. Ingestion of boron can upset the central nervous system. Continued ingestion leads to the clinical syndrome of borism. Borate is an antimetabolite. Synthetic boranes are highly toxic.
Cadmium	do	Cadmium toxicities are implicated in hypertensive diseases of man. Irrigation water needs very stringent control of cadmium to insure that cumulative amounts in plants are not a problem. Synergistic effects with zinc are a problem. Cadmium combines with cell membranes, affecting permeability. It may cause cell membrane ruptures. Cadmium may also lead to heart disease, and possibly cancer.
Chromium	do	Both chromic and chromate ions are needed by plants in small amounts however, at higher than trace levels, chromium ions accumulate in plant and animal tissues, causing toxicity.
Copper	do	Copper is highly toxic to algae, seed plants, and invertebrates. It is moderately toxic to mammals. Copper acts synergistically with cadmium, zinc, and mercury, but is not a systemic poison like mercury or lead. Fresh water fish are also quite susceptible to copper poisoning.
Cyanides	do	Hydrocyanic acid and its salts, the cyanides, are extremely toxic. Toxicity increases with rising temperatures and decreasing pH. Complex cyanides are formed with cadmium and zinc that are much more toxic than the ordinary salts.
Lead	do	There is a considerable variation in toxicity among the various forms of lead. However, it is a cumulative poison. Chronic lead poisoning occurred in animals when 0.18 mg/l was consumed from soft water. Lead can combine with cellular membranes obstructing the passage of nutrients and can cause bursting of the cell membrane.
Mercury	Fresh water aquatic and marine aquatic habitats.	Some organic mercury compounds are able to enter the food chain of aquatic plants, algae, and lower forms of animals. This methylmercury can be biologically magnified to the extent that it can cause death in humans. Methylmercury can destroy cells of the brain causing tremors and ulcers, it can accumulate in the kidneys and liver. Methylmercury can also accumulate in fetuses where it can produce birth defects by breaking chromosomes. Trace amounts of copper can greatly increase toxicity. Shellfish will accumulate very high quantities of methylmercury.
Pesticides and other synthetic organics.	Public water supply	Chlorinated hydrocarbons are very persistant. Organophosphates hydrolyze rapidly to harmless or less harmful products. Cholinergic carbamates and organophosphates are highly toxic to mammals and fish. Chlorinated hydrocarbons may accumulate in animal tissue in high enough levels to preclude human consumption. Phenoxy acid herbicides are subject to rapid biological degradation in soil, but their decomposition in water is not well understood.
Phenols	do	Phenols taint the taste and odor of drinking waters in very minute quantities. Fresh water fish are affected by phenols, the result being anything from intoxication to paralysis to death.
Selenium	Public water supply, irrigation waters.	Selenium poses a special problem for mammals in that it is very easily transmitted through the mammary glands to the milk. Biological magnification in plants is possible, up to 4 to 5 mg/l. Ingestion of the plants will cause toxic symptoms in animals. As little as 0.05 mg/l of selenium in solution will induce biological magnification. Cereal grains and pasture grasses are the most common plants to biologically magnify selenium and cause toxic reactions in humans and cattle.
Silver	Public water supply	It is highly toxic to plants and mammals.
Zinc	Public water supply and fresh and marine aquatic habitat.	It is accumulated in coelenterates and mollusks. Very small amounts of zinc are toxic to oysters. It has also produced toxic results in plants.

CHAPTER 2

Sewer System Evaluation

3-5. *Purpose.* The purpose of this chapter is to explain the Corps of Engineers' position on performing a sewer system evaluation as defined in 40 CFR 35.927 (38 FR 5329).

3-6. *Sewer System Evaluation Components.* A sewer system evaluation is composed of two parts. The first part, an Infiltration/Inflow Analysis, must be performed by all Step 2 construction grant applicants. If Infiltration/Inflow is found to be excessive, the second part, a Sewer System Evaluation Survey will be accomplished.

3-7. *Corps of Engineers Participation in Sewer System Evaluation.* Where requested by local officials and agreed to in the Plan of Study, the Corps of Engineers should perform Infiltration/Inflow Analyses as an integral part of the wastewater management portion of an urban study. The Corps will not perform Sewer System Evaluation Surveys. If such surveys are required, the Corps will assist local officials making application for a Federal grant. The cost of an Infiltration/Inflow Analysis shall be shared in the same Federal to non-Federal ratio as the remainder of the wastewater management portion of an urban study. The local EPA Regional Office should be contacted for the latest technical guidance.

CHAPTER 3

Urban Drainage

3-8. *Purpose.* The purpose of this chapter is to explain the Corps of Engineer's position on the conduct of urban drainage studies as a portion of an urban study.

3-9. *Definition of Permissible Urban Drainage Studies.* a. Planning for urban flood control and wastewater management requires studies of urban drainage systems. Runoff from any given tributary areas may be conveyed through storm sewers, flood control works, or combinations of these two kinds of facilities. In addition, runoff may be treated to remove pollutants before discharge to receiving waters. Moreover, when provision is made for treatment of urban runoff to meet water quality goals and deadlines, different conveyance and/or retention systems may be required.

b. Although urban drainage is a functional water resource category which could be studied for its own sake, Corps of Engineer studies of urban drainage within the Urban Studies Program are limited to considering urban drainage as a part of the flood control major work item or as a part of the wastewater management major work item. Urban drainage planning for areas with separate storm sewers or without storm sewers will not be part of wastewater management planning if receiving waters will not meet the 1983 water quality goal with BPWTT for POTW and BAT for Non-POTW. Urban drainage studies which are not an integral part of flood control or wastewater management planning will not be included in an urban study. Urban drainage, per se, will not appear as a major work item.

3-10. *Cost-Sharing Applicable to permissible urban Drainage Studies.* a. Those aspects of urban drainage studies which are part of flood control planning will be financed at 100 percent Federal expense. The only portions of urban drainage that are countable for 100 percent Federal funding are those portions which appear in either the separable cost row or the individual joint study cost row of Table 2-6 under the Flood Control major work item.

b. Those aspects of urban drainage studies which are part of waste-water management will be financed at the current cost-sharing ratio discussed in para 2-6.c.(4). The only portions of urban drainage that would be countable for cost-sharing are those portions which appear in either the separable study cost or the individual joint study cost rows of Table 2-6 under the wastewater management major work item.

c. Those aspects of urban drainage studies which are not a part of either flood control or wastewater management will not be a portion of the urban study.

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